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AUTHOR	Richison, Tom Z.
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ABSTRACT

This guide is designed to be used as a reference tool for the novice library media specialist in charge of one or several pieces of equipment that must be maintained or repaired periodically. Under acquisition of new equipment, topics include selection procedures and equipment selection aids, while the organization section discusses numbering, inventory, and checkout. Repair and replacement topics addressed include tools, optional equipment, projeection lamps, take-up reels, and audio supplies and accessories. Audiovisual maintenance area organization and arrangement is described. The largest section which is devoted to common repair and trouble-shooting diagnosis for miscellaneous viewers and projectors, describes specific repair techniques, procedures, and solutions. Other sections cover care and maintenance of audio equipment, video equipment, and microcomputers. A glossary and a 12-item bibliography are provided, and an appendix contains sample audiovisual equipment checkout, usage and maintenance forms, and a topic index. (LMM)

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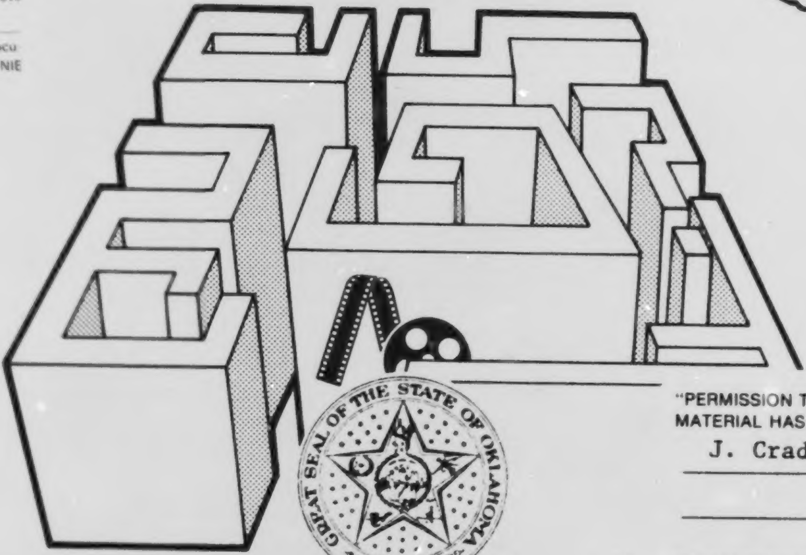
THE MEDIA MAZE



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Acknowledgements

PRINCIPAL AUTHOR

Tom Z. Richison, Ed.D.
Coweta, Oklahoma

SPECIAL CONSULTANTS

Marty R. Fulk
State Department of Education

Susan Wheeler
State Department of Education

Jim Scott
Broken Arrow Public Schools

EDITOR

Barbara Duffy
State Department of Education

TECHNICAL ASSISTANCE

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Jeannie Cawood, Artist, Oklahoma City, Oklahoma

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Foreword

Audiovisual aids have become an essential component of the contemporary method of transmitting information to students. This form of conveying knowledge can be used in group learning processes and on the individual level. Many different types of equipment (hardware) must be utilized in order to transmit information to students. Such hardware must be kept in working order by an individual who knows little about maintenance and repair of any kind of equipment.

This guide or manual is designed to be used as a reference tool for the uninitiated library media specialist, in charge of one or several pieces of equipment that must be maintained or repaired periodically. Some problems are so small that they may be corrected in a matter of minutes, while others, although simple, may take longer. This manual is designed to aid at such times. The Topic Index will help the user find the needed paragraphs easily.

It is the goal of the State Department of Education to aid educators in continually improving the quality of instruction. Thus, we are pleased to provide this handbook with the hope that it will produce implementation of this goal.

Sincerely,

Leslie Fisher

Leslie Fisher
State Superintendent

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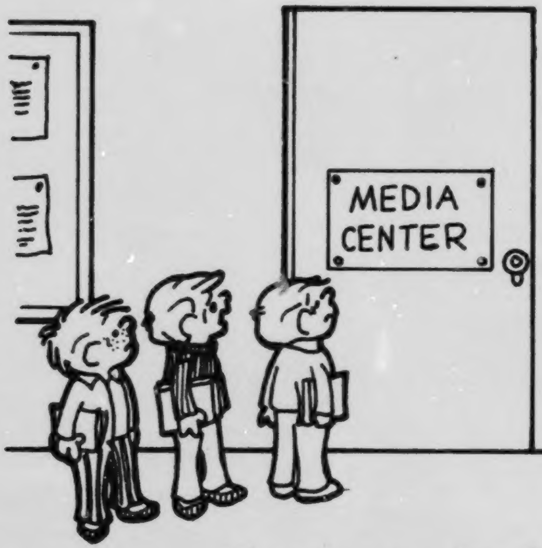
Introduction

Public schools are constantly in the process of changing either from within or without, with new innovations such as ungraded primary, open classrooms and middle school concepts, to name but a few. In addition to these changes the librarians are now assuming the responsibilities of media specialists. This change has placed the librarian in a position of responsibility not only for books and non-book materials, but for hardware[1] and software[2] as well.

As the role of the traditional library has been altered, it has become imperative to change the name. The names vary, ranging from Library Media Center to Learning Resources Center, with various modifications being acceptable.



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"Just when I learn to spell library, they change its name!"

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[1] equipment

[2] materials used in hardware

Regardless of the type or size of the media center, electronic or mechanical problems with the audio visual equipment will most certainly arise. It is the nature of equipment to malfunction after long periods of use, even with the best preventive maintenance.

The responsibility for maintenance of audiovisual equipment belongs to the individuals who wear many hats, the "librarians or media specialists". It becomes their responsibility to maintain the equipment themselves, to employ a technician from a large materials center, or to send the equipment to a repair station, such as a service center or a local radio and television repair shop.

The utlization of this type of repair center is good, if they stock the needed repair parts. However, in many cases, the local radio and television repair shop will handle only parts needed for their own brands of merchandise. This may mean a long period of waiting for parts to be ordered and installed.

Often the library media specialist can perform the simple maintenance on-site. This saves long periods of downtime, in addition to saving on the repair budget.

Since many librarians have had little previous experience with equipment maintenance, this publication will explain various simple maintenance and repair techniques which can be performed without prior training. It is a simple guide for basics, and is not meant for electronics experts.

ACQUISITION OF NEW EQUIPMENT

Acquisition of New Equipment

As funds become available, the library media specialist should have the opportunity to acquire new audiovisual equipment. An efficient library media specialist will have ready at all times an up-to-date "want list" of both hardware and software, in priority order. This list should include both immediate and long range needs. Selection criteria are many and varied. However, final determination of needed hardware depends upon classroom and media center needs.

1. Which audiovisual equipment has been used most?
2. How many requests have been unfilled because of lack of working equipment?
3. What equipment will be needed for new educational programs to be introduced during the coming year?
4. What equipment is wearing out and should be replaced? (The normal life expectancy of audiovisual equipment is five years.)

Once needs have been determined the decision must be made as to which specific brands and models to purchase.

Selection Procedures[1]

Selection procedures include the following:

1. Demonstrations of competitive equipment under identical conditions.

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[1] See Procedures Manual for School Library Media Centers, Oklahoma State Department of Education, 1982.

2. Demonstrations of specific equipment under varying light and sound conditions.
3. Actual tryout of equipment for an extended period of time.
4. Application of directions given in the manual to determine clarity of directions, ease of operation, and simplicity of maintenance.
5. Continuous operation of equipment for a few hours to check temperature and any other critical operating characteristics.
6. Actual practice cleaning, adjusting, dismantling, and reassembling equipment where professional maintenance is not required.

Questions to Consider

1. Is the equipment portable, light in weight, compact?
2. Is the equipment sturdy, attractive, well constructed, or easily damaged or broken?
3. Is the equipment easy to operate? Are controls accessible, clearly marked, and kept to a minimum?
4. Does this equipment consistently meet desirable performance standards in terms of its specific function?
5. Are adaptations easy to perform?
6. Is the equipment easy to maintain and repair?
7. Is the distributor dependable; are repair facilities available?
8. In comparison with the cost of similar equipment, is the price reasonable?

The library media specialist should remain well informed about innovations in new equipment. Good sources are state and national professional publications, commercial publications, professional meetings, and salespeople who call frequently.

Whenever possible, preview audio visual materials (software) before purchasing. Teachers who will use the materials and the media specialist should be included on the preview team. Check for:

1. Appropriateness to the school's curriculum
2. Technical quality
3. Proper format
4. Reasonable cost
5. Content

Several publications are available in various formats to aid in media selection. Some of the available tools are:

EQUIPMENT SELECTION AIDS
(See Bibliography for Addresses)

Audiovisual Directions

The Audio-Visual Directory

Audio Visual Marketplace

Educational & Industrial Television

Electronic Learning

Instructional Innovator

Media and Methods

NAVA Audiovisual Equipment Directory

School Learning Resources

School Library Journal

Hints

Establish an advertisement file for quick reference. File catalogs and advertisements alphabetically by company.

Take advantage of sales whenever possible to stretch your equipment budget. CAUTION: It is NOT a good policy to purchase used audiovisual equipment regardless of the source.

Receiving New Equipment

The media specialist should personally unpack each item as it is received, check for damage and make certain that the equipment is operating properly.

Operating instructions in the form of operational manuals will accompany each audiovisual item purchased. Stamp on each the date received for future reference. Fill out and mail the warranty card as some companies will not honor warranties if a card has not been received from the purchaser.

Warranty

If a problem is discovered with the new equipment while the warranty is still in effect (normally ninety days to one year), call the company immediately to report the problem or problems. Some companies will not honor the warranty for equipment that has been opened or the manufacturer's seal broken. Let the company repairer do any maintenance on such items.

In-service Training

When new types of equipment are received in the media center, the media specialist should hold in-service training for the teachers, covering explanations of new utilization procedures. This training should be direct and to the point, with demonstration and hands-on experience setting up and operating equipment, and pointing out what to watch for during use.

Also, emphasize storage and care of new items. This is important because one mistake can ruin sensitive equipment.

Discarding Old Equipment

When equipment becomes old and obsolete to the point that replacement parts can no longer be obtained it is advisable to legally dispose of the equipment and remove it from your inventory.

By removing unusable equipment, you will not only be keeping your inventory list current, you will also have more storage space available. Many times if parts are still available for old equipment, the expense of the parts is greater than the value of the equipment.

According to the School Laws of Oklahoma, "The Board of Education of each school district shall have power to: . . . Dispose of property no longer needed by the district by sale, exchange, lease or otherwise."[1]

In other words, the article may be sold in any reasonable manner the board of education believes will bring the highest price. Most schools have a director of surplus property. Contact this person about local board policy concerning the removal of equipment.

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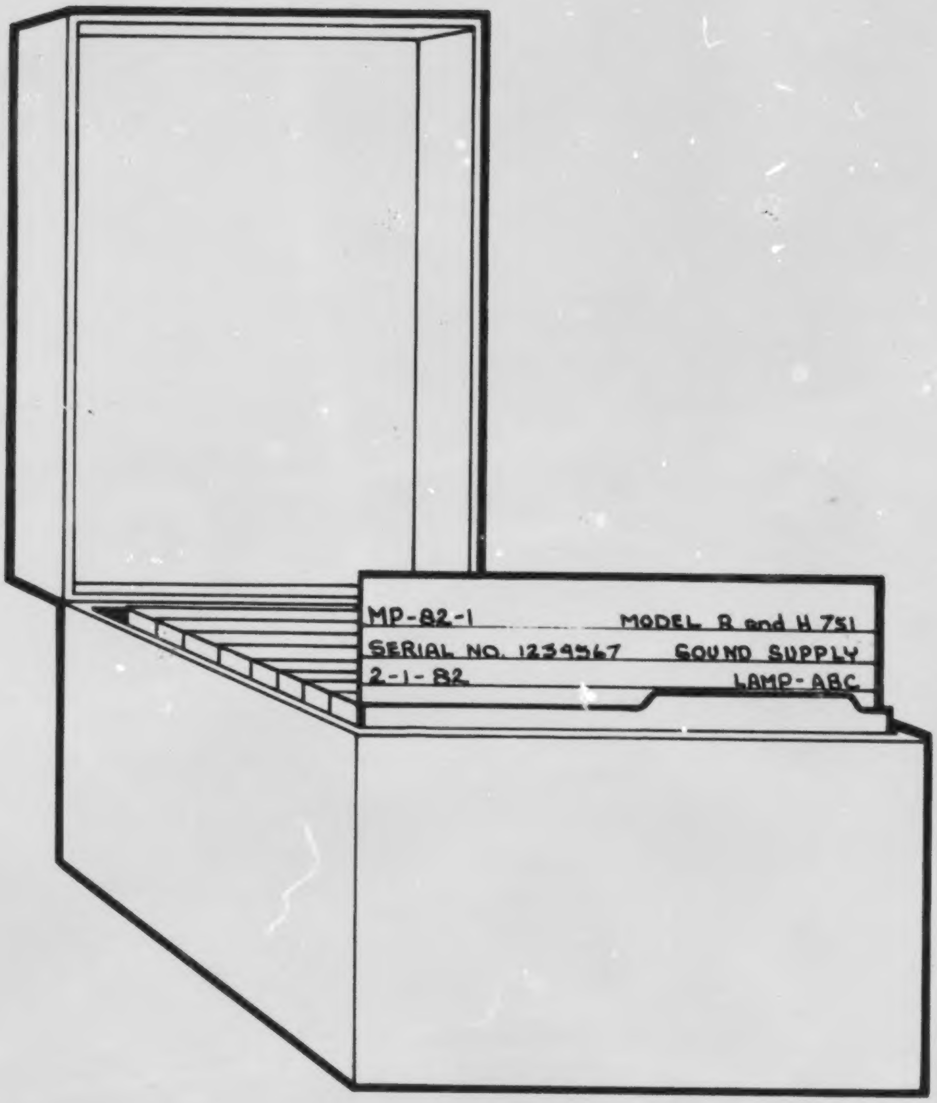
[1] School Laws of Oklahoma, 1980 and 1981 Supplement to School Laws of Oklahoma, Section 64, Powers and Duties - Rules and Regulations, p. 59.

ORGANIZATION


MP-82-1
MODEL R and H 751
SERIAL NO. 1234567
SOUND SUPPLY
2-1-82
LAMP-ABC

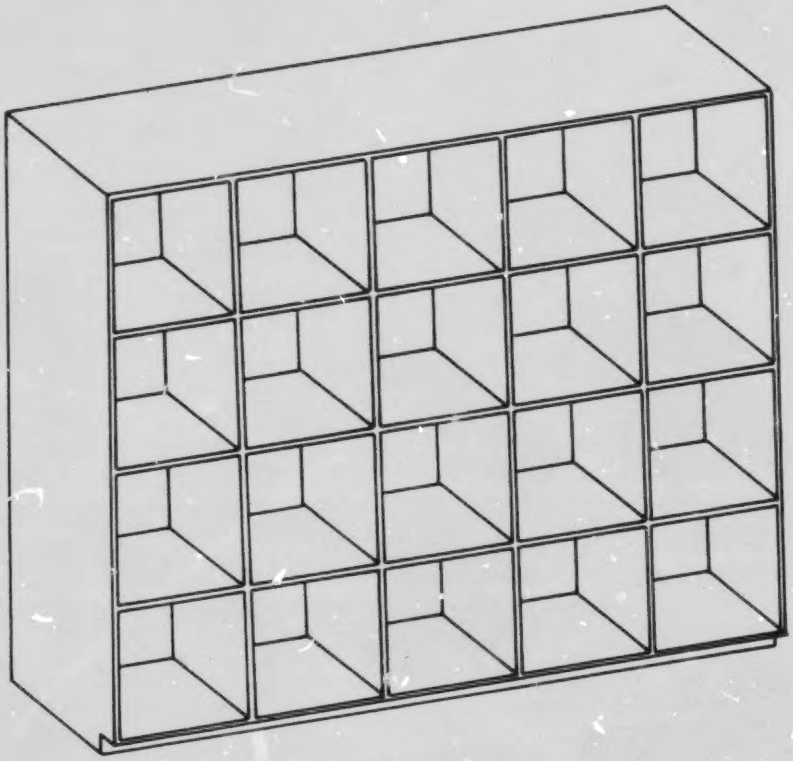
Organization

As additional audiovisual equipment is placed in the library media center the problem of diverse organization will arise. Decisions must be made concerning equipment and audiovisual materials in addition to traditional books, periodicals and related materials.

First a special location within the media center should be set aside for the AV hardware. Allow plenty of room, since equipment will require ample space. It may be desirable to store AV equipment in an existing closet, for reasons of security and cleanliness. Dust is less likely to affect the equipment stored in an enclosed location. In addition, equipment should always be kept off the floor.

Be sure to ascertain the strength of the existing shelves upon which heavy equipment is to be stored. Audiovisual equipment will require a larger space than books, so if existing shelves must be utilized, they may need to be expanded. If possible, purchase specially designed shelves. Some media centers have replaced wooden shelves with reinforced metal shelving to accommodate the equipment.

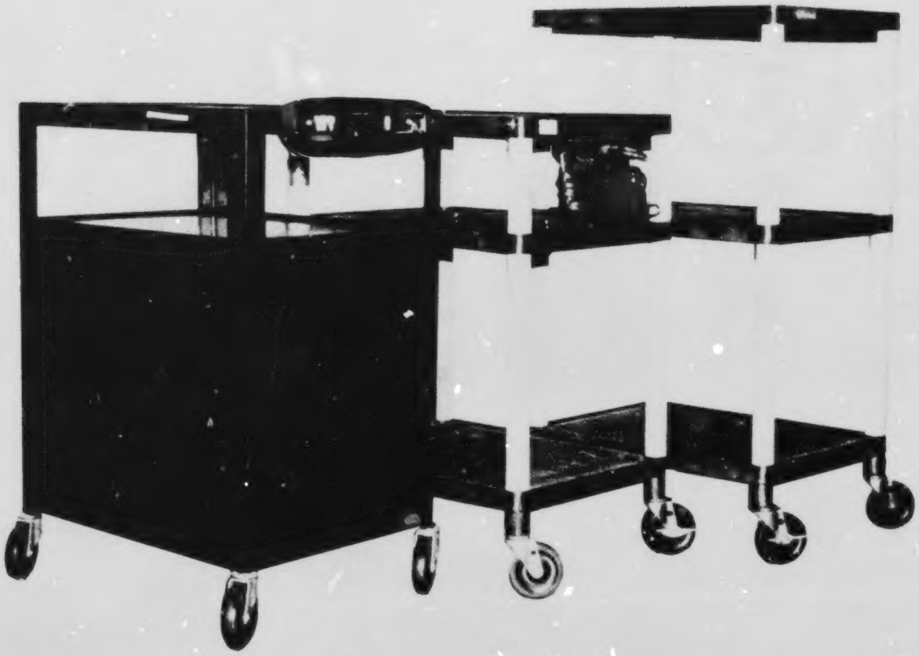
One of the most useful storage designs is two foot cube shelving. The storage unit may be six or eight feet high, and should be four inches off the floor, thus preventing equipment from being placed at floor level. This will allow storage of almost any type of hardware with room to spare.



If shelves are out of the question in your situation, consider moveable tables or carts. Not only are carts convenient for moving AV equipment from one location to another, they also provide adequate storage space when a proper cover is included for the equipment.

A cart usually comes with two or three shelves. The top one is for equipment and the bottom for storing cords and special devices needed for use with the projector, etc. Some carts are wired with electrical outlets, which eliminates the use of many extension cords. Each electrical cart requires only one cord for all pieces of equipment plugged into it.

Some carts are specially designed to hold overhead projectors. Also available are models equipped with a storage compartment that can be locked. Many have a vinyl or rubber top not only to protect the table, but also the equipment.



If a portable screen is needed in the classroom carry it on the bottom shelf of the cart. Never transport a screen on the top shelf with the equipment. If the screen should accidently fall while being transported, damage may occur to both the screen and the equipment.

Numbering Equipment

A classification system must be devised to identify each item. There are various cataloging procedures to follow in which number, letter and/or color codes are used.[1]

A single informative system of coding which uses the type of equipment and date can be helpful. For example, on a 16mm motion picture projector, you may wish to use the identification "MP". (If the projector were purchased in 1982, the number after the "MP" would be "82".) If this projector were the first one purchased in 1982, the next code number would appear as "1". Thus the code would be MP-82-1. This number should be placed on the side of the projector in large print. School identification should then be added. For example: The code for Franklin Junior High School could be "FJHS". These letters should be placed near the code number along one side or in a position where it can easily be seen.

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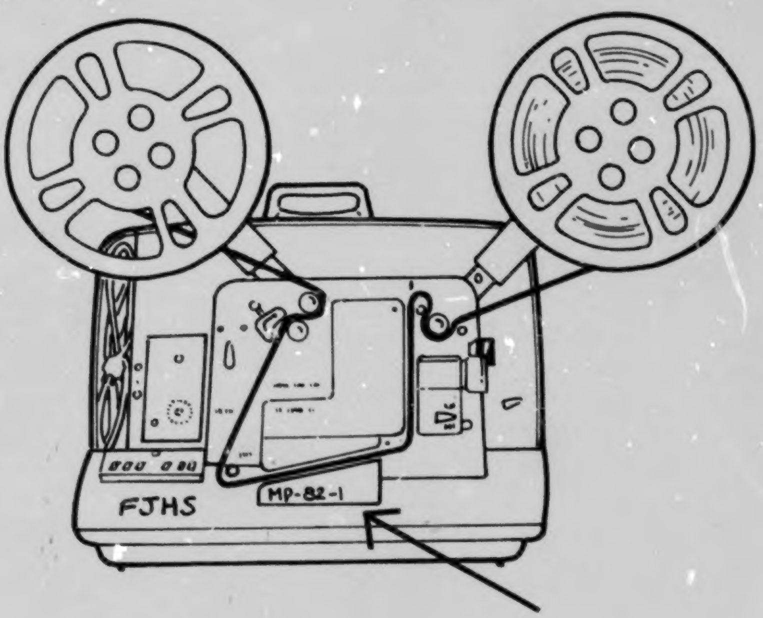
[1] See Procedures Manual for Library Media Centers, State Department of Education.



Suggested Nomenclature for Identification of A-V Equipment

16mm Projector	MP	Public Address System	PA
Slide Projector	SP	Microphones	MIC
Filmstrip Projector	FSP	Test Equipment	T
Overhead Projector	OHP	Video Tape Recorder	VTR
Tape Recorder	TR	Video Camera	VC
Cassette Recorder	CR	Video Monitor (TV set)	VM
Record Player	RP		

The nomenclature could be endless. However, it is important to decide upon a system and stick to it. You should not have any problem identifying an item and its intended use.

Inventory

As with all other items in the media center, an inventory of AV equipment is necessary. This inventory list should be kept with other inventoried book and non-book materials, for example, in the accession file. With the numbering system already designed for the equipment, it is no problem to place these items with a specific number on your inventory list or cards.

Undoubtedly each school has an inventory system. However, make sure each of the following items is included for your AV equipment:

Item - Type of equipment (e.g. -tape recorders, reel-to-reel or cassette, etc.)

- - -

Date received - The date upon which delivery of the item was taken.

- - -

Description - Describe the type of equipment, special functions, etc. (This should be a short notation)

- - -

Lamp used - If applicable

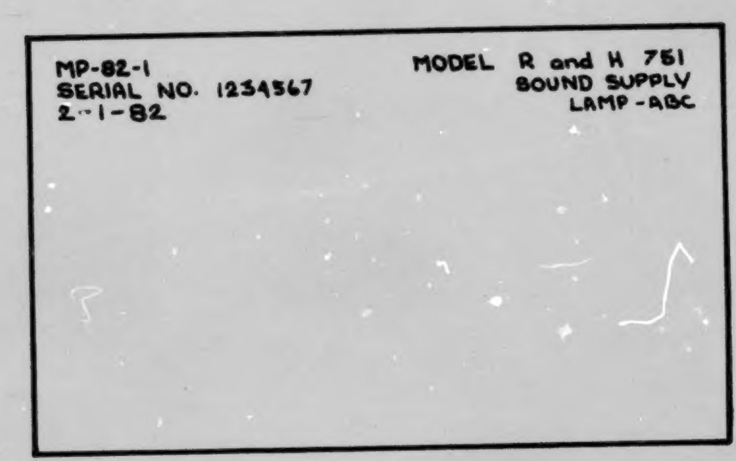
- - -

Serial Number - On the bottom, top, or in an obscure location on the equipment is a serial number. This identification appears as four to ten numbers or more. Letters may be included at the beginning, middle, or end depending upon the manufacturer. Nevertheless, look closely, because the number may be small and at times difficult to read. Some manufacturers place the serial number inside the equipment. If this occurs, place your own identification number in a location on the equipment where it will not be eradicated.

- - -

Manufacturer -	The manufacturer's name and complete address
Model -	The manufacturer's designation of a product
Your Identification Number -	The complete number you assigned to that item. e.g. MP-82-1.
Cost at the time of Acquisition -	Price at the time the equipment was purchased rounded off to the nearest dollar.

- - -



MP-82-1
SERIAL NO. 1234567
2-1-82

MODEL R and H 751
SOUND SUPPLY
LAMP-ABC

Checkout Procedure[2]

There are many different ways to check out audio visual equipment. For example, if there is a card for each item, have the teacher sign for the equipment. Retain the card until the equipment is returned. Cards may be placed in a pocket which is fastened to the equipment. When the equipment is returned, the date is recorded on the card and the card is placed back in the pocket. Some AV equipment contains several components. For instance, a portable television recorder may include a recorder, camera, monitor, and possibly a portable power pack. Will teachers be required to sign a card for each item?

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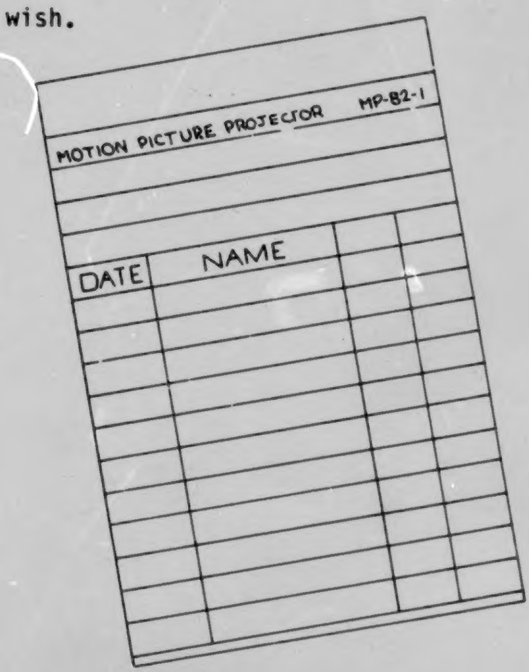
[2] See Procedures Manual for Library Media Centers, State Department of Education, 1982.

If the equipment comes in sets, one signature may suffice. However, if the teacher should desire more of the same type of equipment, another card should be signed. It is important that you know where each piece of equipment is located, and who is responsible for each item or items.

At the top of the checkout card place only the needed information and nothing else. The card may need only the equipment name and your audiovisual number. It might also include the lamp number for quick reference if you wish.



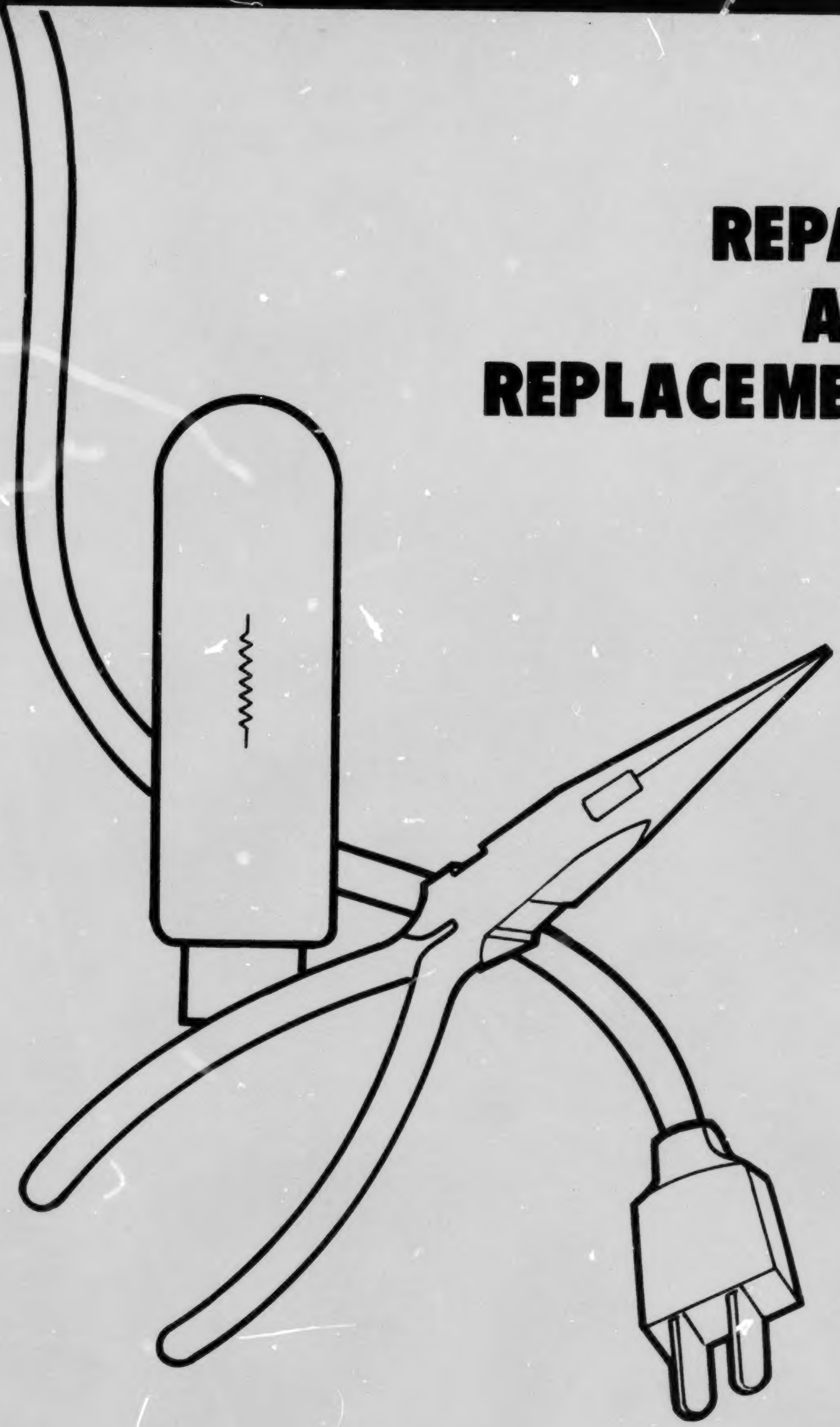
MOTION PICTURE PROJECTOR MP-82-1

DATE	NAME		

Checkout Procedure - Magnetic numbers or Hooks

In another checkout method the equipment number is attached to the piece of equipment on a magnet or a shower curtain hook. When this equipment is checked out, the number is placed on a magnetic board or peg board next to the name of the teacher who now has the equipment. When the item is returned the number is again attached to it. This system can be as simple or as complex as you make it.

REPAIR AND REPLACEMENT



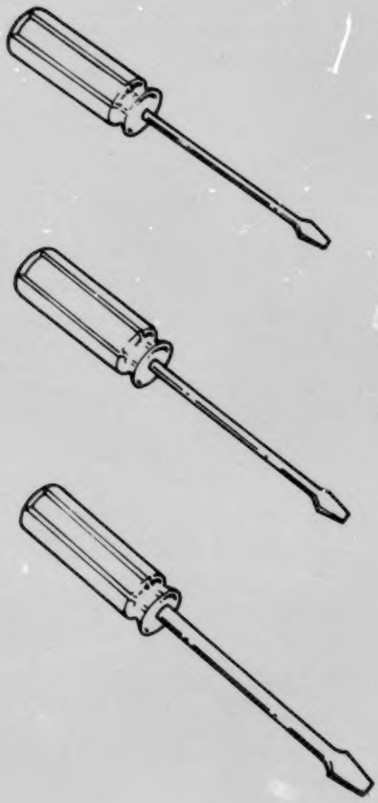
Repair and Replacement

Budget and Acquisition

Planning and budgeting must include not only acquisition of new hardware and software, but also their repair and replacement. Worn out and malfunctioning parts must be replaced, and some items not permanently attached to the equipment may be lost (e.g. jacks, patch cords, extension cords, nuts and bolts, even equipment manuals).

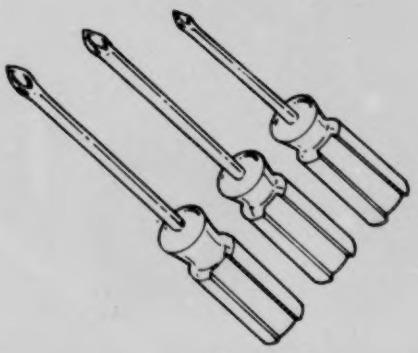
Tools

In order to properly maintain and repair any type of equipment, it is wise to have on hand the proper types of tools. This section contains a list and simple description of common tools that are widely available.



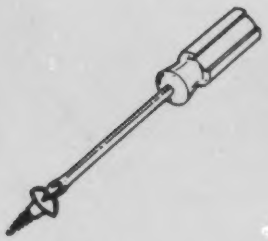
Screwdrivers - Not enough can be said about a good set of screwdrivers. Since practically all machines are fastened together with screws, it is wise to have on hand a variety of different sizes of both standard and Phillips screwdrivers. A minimum of three standard screwdrivers is recommended: one with a blade width of approximately 1/8 inch, for small, hard to get to places; one with blade width of approximately 1/4 inch, such as that used on equipment cases; and one with a large blade, approximately 1/2 inch wide for much larger screws and bolt heads, such as those used on projector carts and stands.

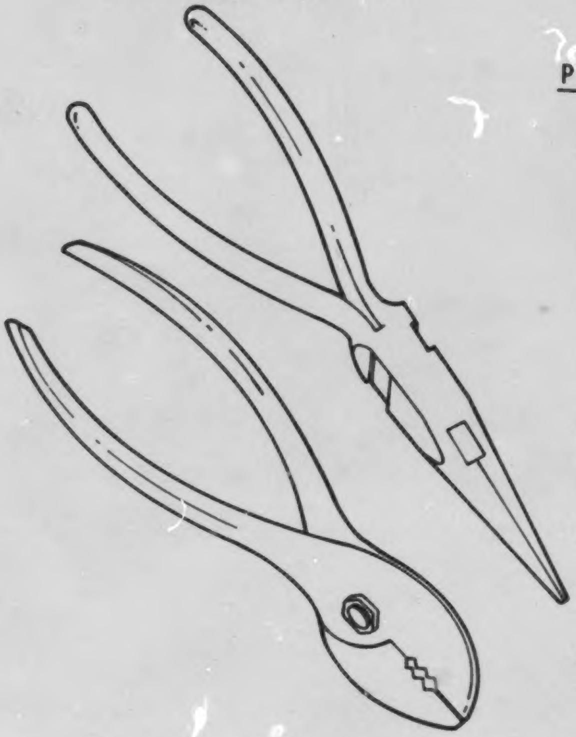
Phillips screwdrivers: As with a standard screwdriver, the proper size Phillips driver to fit the head of a screw must be used to avoid damage to the head, or the screw will not be removeable. Never use a standard blade screwdriver on a Phillips head screw. You will damage both.



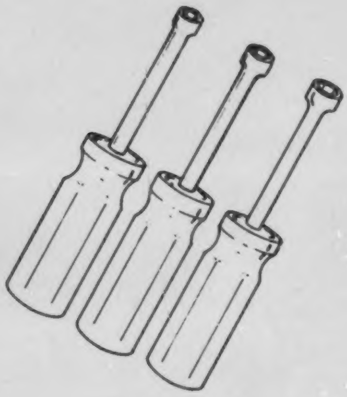
An abused and damaged screwdriver should be replaced as soon as possible.

A magnitized screwdriver helps to remove and replace screws located on tight places where fingers will not fit.





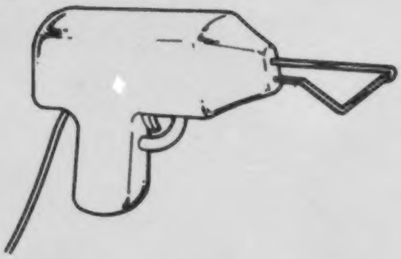
Pliers - A minimum of two or three types of pliers are needed. They include a standard pair of utility pliers, six to eight inches long, which may be used for a number of applications; a pair of needle nose pliers, for those hard to get to places (needle nose pliers may include a wire cutter and/or stripper attachment within the jaws).

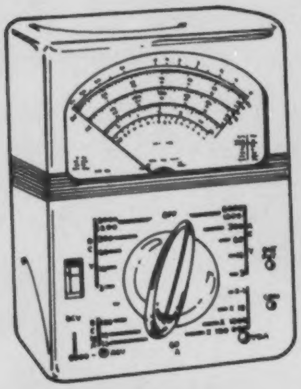


Nut Drivers - This is a screwdriver-like tool, with a socket type attachment on the end. A set may contain four to five drivers ranging from 3/6 inch to 3/8 inch or 1/2 inch.

Optional Equipment

Soldering Iron (or gun) - Get one which heats up rapidly for quick repairs. Keep a roll of 60/40 solder handy.





Volt-Ohm Meter - (VOM) This is a device to measure AC and DC voltage (shown in volts), to measure resistance (shown in ohms), which can also be used to check continuity of cables for bad connections.

Replacement Parts

Each school system has its own method of requisitioning replacement parts. However, when a requisition is made, be sure to include the number and description of each item ordered, along with the model number and serial number of the equipment. Manufacturers often redesign the internal works of equipment while the exterior remains the same as previous models. The model number is the only clue to the change.

Most parts needed can be purchased from a local source, an electronics supply house, or purchased under state contract. Purchasing from a local source means that you will pay a higher price for parts than when purchasing from an electronics supply house. The disadvantage of using an electronics supply house lies in the fact that they deal in volume trade, and might sell only in quantities you may feel are too large for your needs. Cooperation within the district for such purchases may be the answer to allow schools to take advantage of the resulting savings.

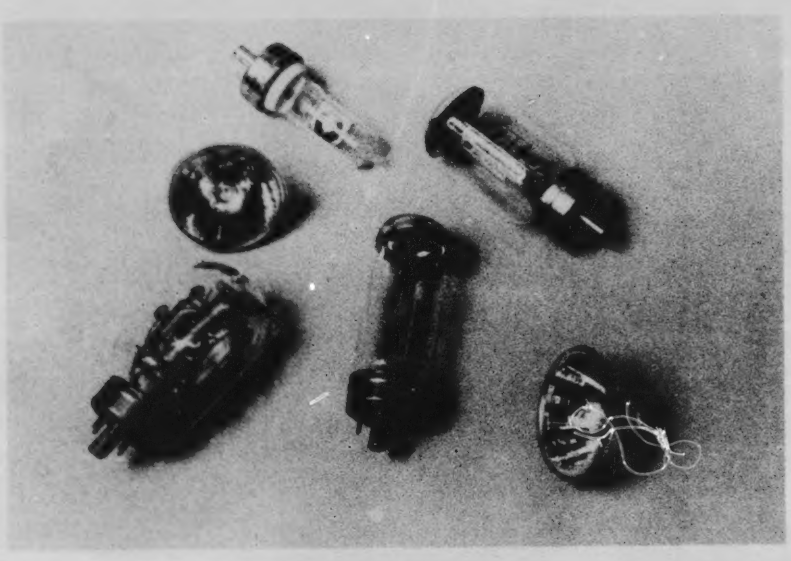
Purchasing under state contract may result in savings of as much as 50 to 60 percent. Check with the school district business office to obtain the needed information. It is generally wise to order sufficient quantities for at least one semester.

Projection Lamps

Projection lamps have a habit of burning out at the most inconvenient times. Thus the library media specialist must always maintain a large stock of lamps. The following is a suggested number of lamps to keep in stock for each projector.

Suggested Number of Lamps Needed for the School Year for AV Equipment

AV Equipment	Projection Lamps	Exciter Lamps
16mm Projector	4	2
Filmstrip Projector	2	
Carousel or Slide Projector	4	
Overhead Projector	4	
Kodak Analyst Projector	2	
Regular 8mm Projector	2	
Super 8mm Projector	2	
Opaque Projector	2	
Film Loop Projector	2	



When replacing a projection lamp, it is advisable to use the manufacturer's suggested replacement lamp. Even though other lamps may fit into the lamp socket and will operate, there is a danger of replacing the burned out lamp with a higher wattage lamp which could cause overheating or damage to the lens system.

If it should be necessary to replace a burned out lamp with a substitute, first check with the following lamp substitution guide. This guide tells the exact lamp replacement for the lamps burned out, the wattage or amperes, lamp end or base, whether that lamp will last longer than the burned out lamp, the amount of heat produced by the lamp and lamp dimensions. Some operator's manuals, or the equipment itself, may list lamp replacements.

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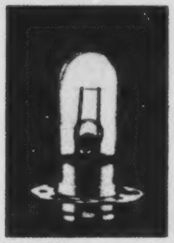
Most Commonly Used
AUDIO-VISUAL PROJECTOR LAMPS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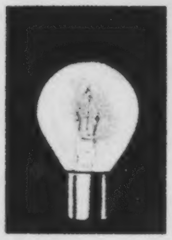
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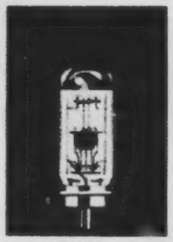
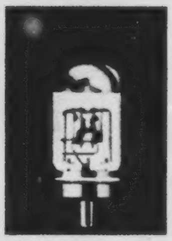
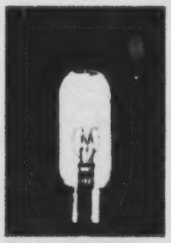

CAL/CWD/CRT


CAR/BEH/DFF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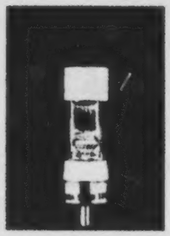
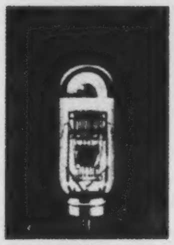
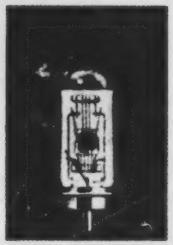
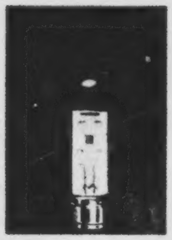

CBA/EGX/DEK/DFW/DAH


CTT/DAX/CWA/CYS/
CZA/CZB


CZA/CZB/CAL/CWA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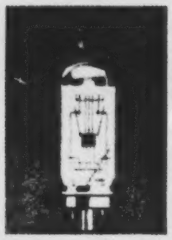
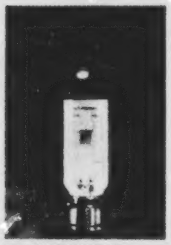

DAK/DAY/DAT/CWD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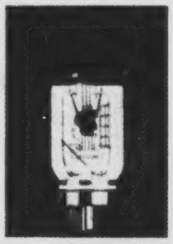
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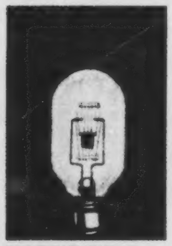
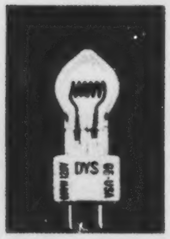
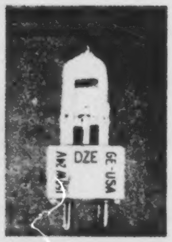
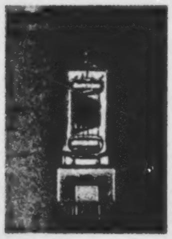

DRS/DPJ/DRB/DRC

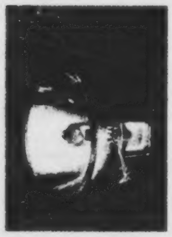


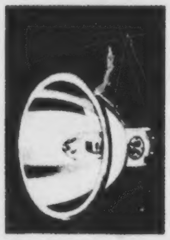
DYS/DYV/BHC/EKB

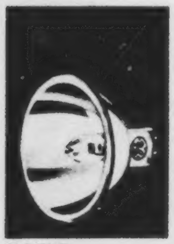


DZE/FDS




EJL/EJA/ELC


EKG/ENW/ENC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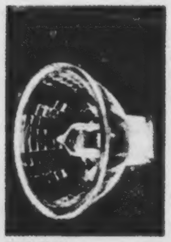
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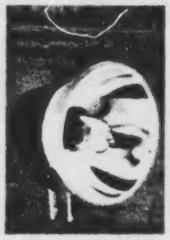
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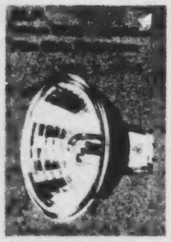
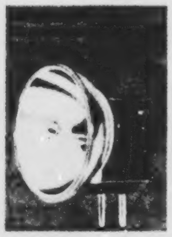
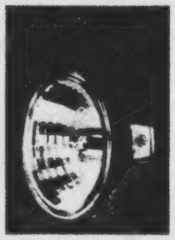
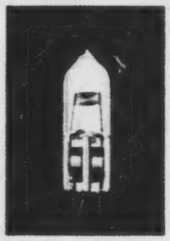
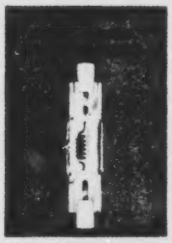
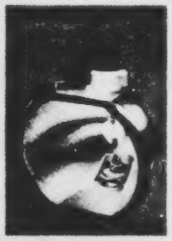

ELH/ENH/ENG


EMM/EKS




FCS/FDV


FFJ/FAL


MARC-300/16

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LAMP SUBSTITUTION CHART

If you need to replace this lamp	This lamp may be substituted	If you need to replace this lamp	This lamp may be substituted	If you need to replace this lamp	This lamp may be substituted	If you need to replace this lamp	This lamp may be substituted	If you need to replace this lamp	This lamp may be substituted
BAH	BBA	CDD	CBJ	CWD	CAL	DFF	CAR	DRW	DPT
BAK	BRS	CDJ	CEB	CWW	CVS	DFG	DFA	DSB	DPW
BCK	CZA	CDK	CBX	CXF	CTL	DFK	DFY	DTC	DRW
BEH	CAR	CDS	CBJ	CXK	CXY	DFN	DCH	DTJ	DSB
BEJ	BEC	CDX	CDS	CXP	CAL/CWD	DFP	DCH	DYV	DYS
BFK	BFL/DGH	CEA	CEB/CDK	CXY	CXK	DFT	DFD	DVY	DYH
BFL	DGH	CEB	CBX	CYC	CTM	DFW	DEK/DAH	DWA	FGS/DXK
BHC	DYS	CEG	CCK	CYK	CRT	DFY	DFK/DEJ	DWW	FAL
BHF	BHD	CEL	CBX	CYS	CTT/CWA	DFZ	DLD	DWY	FAD
BKC	BKG	CEM	CBJ	CZA	CAL	DGB	DFE	DXN	DXW
BKF	BLC	CET	CHG	CZB	CZA	DGF	DGA	DZL	DYT
BKG	BKC	CEW	CDS	CZF	CZX	DGH	DDY	EDB	DMX
BLK	BKR	CFC	CEW	CZX	CXY	DGL	DGS	EGH	DYY
BLR	BKV	CFK	CGP	DAB	CZX/CXY	DGR	DEP/DAY	EJL	EJA
BLX	BLC	CGF	CGP	DAH	EGX	DHF	DAH	EJN	ELD
BMD	BMY	CGT	CGW	DAK	DAT/DAY	DHN	DEK	EJS	EJM
BMG	BLX	CGW	CEW	DAT	CWD	DHS	DGS	EJV	EKE
BMH	BMG	CHD	CCM	DAX	CTT/CWA	DHT	DFD/DFT	EKD	DYS
BMY	BLR/BMD	CHG	CFY	DAY	CWD	DHX	DLS	EKE	EJV
BNF	BLX	CHK	CGE	DBH	CYS	DJA	DCH	EKG	ENW
BRH	DXW/DXN	CHS	CHW	DBM	CTT	DJL	DFG	EKS	EMM
BRS	BAK	CJD	CHW	DBR	CTL	DKM	DLR	ELB	ENZ
BSA	BAK	CJJ	CHY	DCA	DEF	DKR	DLS	ELC	EJL
BSB	BSS	CJT	CJW	DCC	CZX	DLE	DLD	ELH	ENG/ENH
BTL	CZX	CJX	CHY	DCH	DCL	DLG	DLS	ELR	ELS
BTM	BTL	CLG	CLS	DCX	CZS	DLH	DJL	ELT	ELE
BVS	BVK	CLS	CGW/CMV	DDB	CZX	DLN	DEK	ENA	EKP
BZW	CAS	CLX	CCM	DDW	DDB/CZX	DLR	DKM	ENB	EJV/EKE
CAC	CAJ/CAX	CMA	CHG	DDY	DGH	DLS	DKR	ENC	ENW
CAE	CDD	CMB	CLX	DEC	DAS	DMD	DGB	ENG	ELH/ENH
CAJ	CAC	CMK	CHG	DEJ	DAG	DMK	DML	ENH	ELH/ENG
CAL	CWD/CRT	CMS	CNC	DEK	CBA/DAH	DNR	DMX	ENW	EKG
CAR	BEH/DFF	CMT	CMV		DCY/EGX	DPB	DMS	FAB	DWY
CAS	BZW	CMV	CLS	DEL	DEK	DPJ	DMX	FBD	FBG
CAV	CAS	CNC	CLX	DEP	DAK/DAY	DPT	DRW	FCS	FDV
CAX	CAC	CRA	DGA	DER	DAH/DEK	DPW	DSB	FDS	DZE
CBC	CBJ	CRT	CAL	DFA	DFG	DRB	DRC	FDV	FCS
CBJ	CAS	CRX	CRL	DFC	DFN	DRC	DRB		
CBS	CBX	CVX	CVS	DFD	DFT	DRG	DMS		
CCM	CGP	CWA	CZA	DFE	DGB	DRS	DPJ		

NO SUBSTITUTE LAMP IS AVAILABLE FOR THE FOLLOWING:

BAL
BBA
BCA
BCS
BDW
BEB
BEC
BEP
BES
BEV
BEY
BFA
BFB
BFR
BFT
BFX
BGB
BGK
BHA
BHB
BHD
BHG
BJC
BJJ
BJS
BJW
BKG
BKR
BKV
BLC
BMA
BNB
BNK
BNS
BRD
BRK
BRS
BRX
BSK
BSS
BSW
BTD
BTK
BTT
BVA
BVB
BVE
BVK
BVL
BVR
BWC
BWJ
BWR
BWY
BXB
BXE
BXJ
BXT
BYD
BYJ
BYM
BYR
BYT
BZG
CAD
CAG
CBA
CBX
CCB
CCK
CDK
CER
CFA
CFY
CGD
CGE
CGP
CHY
CHW
CJW
CNJ
CNP
CNS
CNX
CPB
CPF
CPG
CPR
CPW
CRC
CRL
CRS
CST
CTB
CTL
CTM
CTR
CTW
CVJ
CVS
CWG
CWR
CWY
CXD
CXG
CXH
CYA
CYB
CYE
CYF
CYG
CYN
CYR
CZC
CZG
CZJ
CZS
DAC
DAF
DAN
DAR
DAS
DBK
DBR
DBT
DCE
DCF
DCL
DCN
DCS
DCW
DCY
DDJ
DDK
DDL
DDM
DDN
DDP
DDS
DEA
DED
DEF
DEJ
DES
DET
DEX
DFH
DFJ
DFN
DFR
DGA
DGB
DGE
DGJ
DGS
DGX
DHB
DHH
DHJ
DHW
DJD
DJR
DJT
DKF
DKK
DKM
DKY
DLC
DLD
DLT
DLY
DMB
DMG
DMH
DMJ
DML
DMS
DMX
DNC
DNE
DNF
DNK
DRL
DSR
DSW
DTS
DTW
DWB
DWF
DWZ
DXC
DXL
DYA
DYF
DYH
DYP
DYR
DYS
DYT
DYY
DZA
DZB
DZE
EAL
EBR
EBW
ECT
EDK
EFM
EFN
EFP
EFR
EGX
EHA
EJA
EJM
EJV
EJY
EJZ
EKB
EKC
EKD
EKL
EKN
EKP
EKZ
ELA
ELD
ELE
ELJ
ELS
EMC
EMG
EMH
EML
EMM
ENL
ENX
ENZ
EPG
EPN
EPT
EPV
EPX
EPZ
ERV
ESC
ESD
ETS
ETT
FAL
FBG
FCB
FCR
FCS
FDT
FEA
FEB
FFJ
FGA
MARC-300/35K
MARC-300/16
MARC-300/16A
MARC-350/161

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Take-up Reels

In addition to the supply of lamps, each 16mm projector needs a sufficient number of take-up reels. These reels vary from 400 feet take-up capacity or 11 minutes running time to 2,000 feet take-up capacity or 55 minutes running time.

Take-up Reels

Size or reel and Take-up capacity	Running Time
400 ft.	11 minutes
800 ft.	22 minutes
1200 ft.	33 minutes
1600 ft.	44 minutes
2000 ft.	55 minutes

It is advisable to stock at least two 400 ft. reels for each 16mm projector, along with two 800 ft. reels, and one 1,200 ft. take-up reel, and two or three 2,000 ft. take-up reels, as they will be needed throughout the school year. It is impossible to determine the exact number of reels needed for all situations; however, remember that a larger reel will carry the take-up capacity of a smaller reel. Take-up reels are relatively inexpensive; therefore, it is advisable to have a sufficient number on hand for all situations.

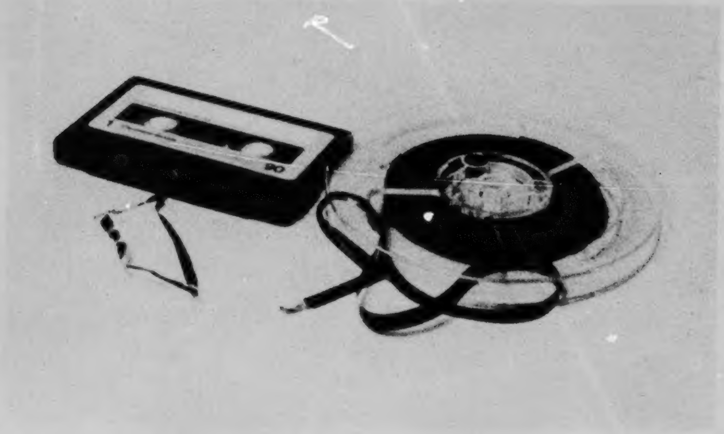
Audio Supplies

Many school systems have some type of reel-to-reel tape recorders, cassette recorders, and other types of audio recorders for special purposes. Regardless of the type of audio recorders in the media center, it is advisable to have on hand a sufficient number of blank reel-to-reel and/or cassette tapes for classroom use.

Of the three sources for purchasing replacement parts--local sources, electronic supply house, or state contract, a local source is suggested for tapes, because malfunctioning tapes can be easily returned for replacement, thus saving time and expense. However, the savings obtained by purchasing in larger quantities from the other two sources may make up for a new malfunctioning tapes. The decision rests with the media specialist.

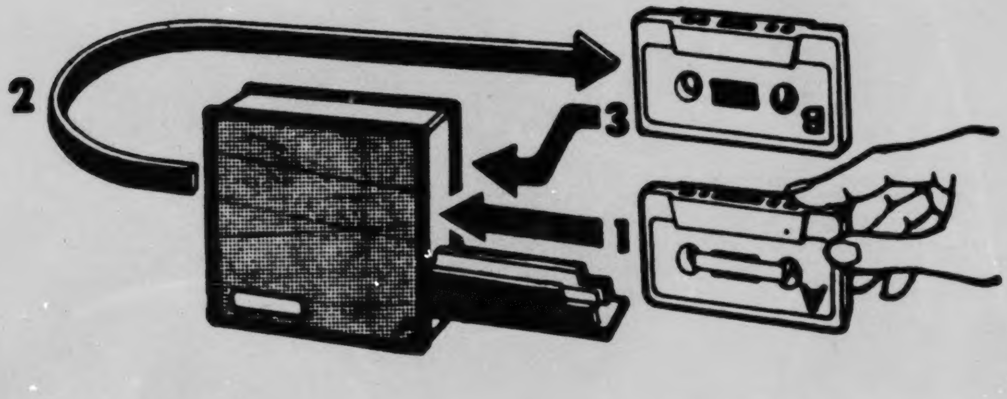
As many brands of reel-to-reel magnetic recording tape or cassette recording tape can be found on the market, criteria must be established for evaluation. Some authors suggest that the purchase of recording tape be based upon the thickness of the recording tape expressed in mil or 1/100 inch. Others suggest that purchase be based upon signal-to noise response or frequency response. Frequency response might be defined as "how effectively the recording tape picks up all incoming signals." Some recording tapes will not pick up high or low signals, resulting in a less desirable reproduction. Regardless of which criteria is used, a tape of less than 1 mil can jam or break frequently.

Throughout the school year, breakage of reel-to-reel and cassette tapes may occur. The splicing of broken tape is a simple procedure outlined in "Care and Feeding of Learning Resource Audio Equipment" later in this manual.

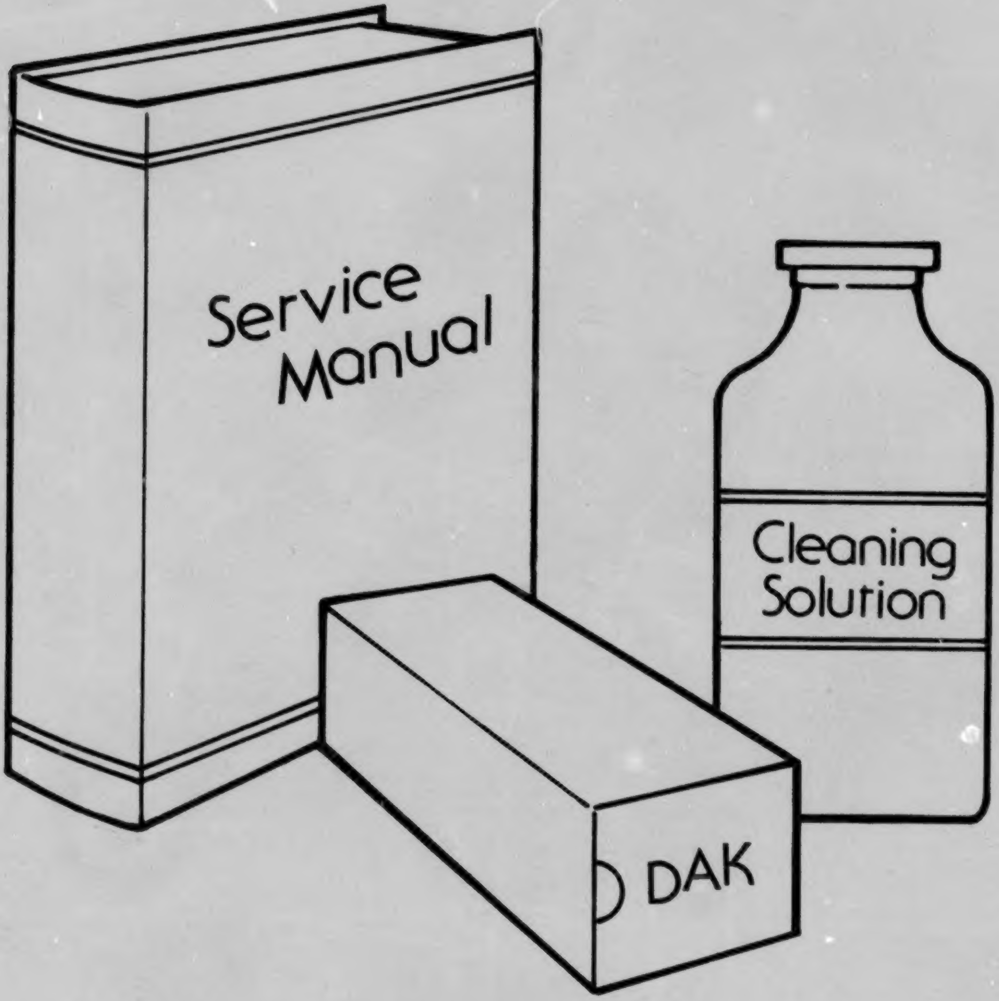


Audio Accessories

If a heavy demand is placed upon your media center for blank reel-to-reel and cassette tapes, it will be to your advantage to purchase a bulk eraser so that unwanted audio signals can be quickly removed and the tape made ready for classroom or duplicating use.



AUDIOVISUAL MAINTENANCE AREA


Service Manual
Cleaning Solution
DAK

Audiovisual Maintenance Area

Location and Floor Plan

A workroom area to accommodate the size and demand of services needed in order to maintain the existing audiovisual equipment should be located in the library media center, with easy access for all sections within the center and yet be housed in a separate room if at all possible.

The physical facilities should include a sink with hot and cold running water, storage for equipment and spare parts, adequate lighting, a large work bench with several electrical recepticals and proper ventilation.

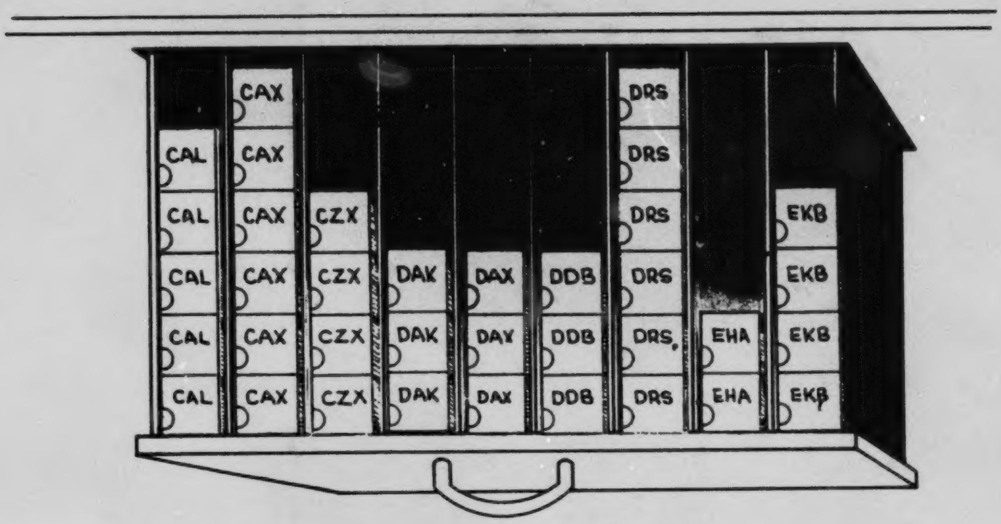
At least once each semester equipment should be cleaned and checked for operation. If compressed air is available, blow out dust and dirt which accumulates after long periods of operation. This dust and dirt can cause a great deal of trouble with audiovisual equipment. (Inexpensive canisters of compressed air may be purchased from audiovisual equipment suppliers.)

Organization

The workroom should be designed with adequate storage space for a variety of parts, such as projector bulbs, lamps, exciter lamps, tubes, fuses, audio plugs, male and female jacks, patch cords made for the on-hand audio equipment in the media center, electrical extension cords of various sizes, manuals, nuts, bolts, paint, wire, assorted parts, cleaning equipment, etc.

Projection Lamps

Because of the large number of different types of projectors, all requiring different styles and types of projection lamps, a variety of lamps should be kept in stock.


CAL
CAL
CAL
CAL
CAL
CAX
CAX
CAX
CAX
CAX
CAX
CZX
CZX
CZX
CZX
DAK
DAK
DAK
DAX
DAY
DAX
DDB
DDB
DDB
DRS
DRS
DRS
DRS
DRS
DRS
EHA
EHA
EKB
EKB
EKB
EKB

Storing the lamps in drawers or on shelves with partitions helps the boxes remain stationary with the lamp number or identification label facing upward or outward so that a quick survey of present stock can be made. Place the lamps in numerical or alphabetical order. Keep a list of all projectors with model and lamp numbers posted in a conspicuous location in the workroom. Using this list, a secretary or teacher could locate the appropriate lamps according to model number if the media specialist were not available.

Small Parts Storage

Small parts such as fuses, audio plugs and jacks, should be stored in small (plastic) storage compartments. Each compartment should be marked or labeled according to contents. Keeping a small stock of parts on hand will save valuable downtime.

Extension cords and patch cords should be placed on a peg board with peg board hooks. All other parts, wire, nuts and bolts, etc., should be stored in bins or compartments for easy accessibility. Remember--a clean workroom prevents accidents and wasted time.

Workroom Library

A valuable resource in the workroom is the library of service manuals on all audiovisual and other related equipment in the library media center. These manuals will aid you in replacing any malfunctioning parts by supplying replacement parts numbers. This will help insure that your order will be quickly processed and the parts sent to you with little downtime.

Most vendors supply the service manual with the equipment. If a service manual does not accompany the equipment, request or order a manual from the company or manufacturer.

Along with the service manuals, keep a file of 5" x 8" cards on which service records are kept for all audiovisual equipment. These cards allow a quick check on past maintenance showing which equipment is not holding up under normal classroom use. With the maintenance records, projection of needed parts and supplies can be more easily made.[1]

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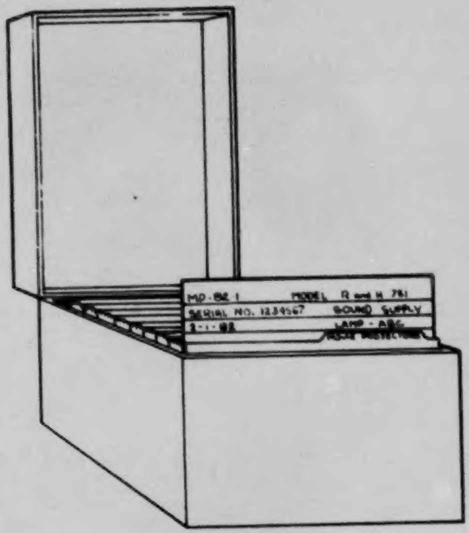
[1] See Procedures Manual for School Library Media Centers, State Department of Education, p. 64.



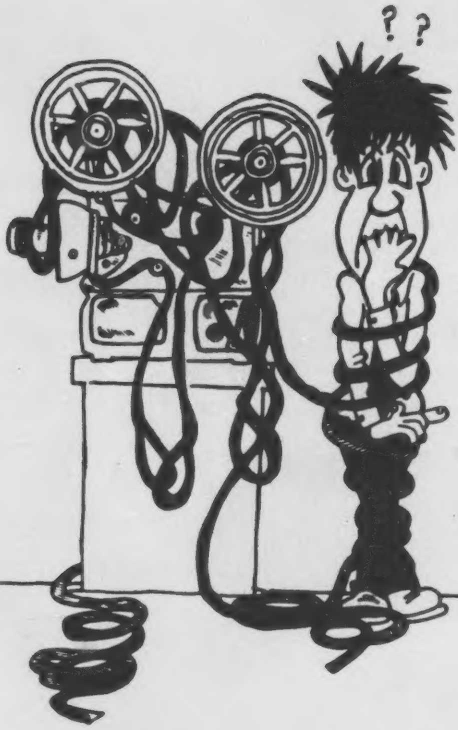
Types of Maintenance

A complete media center workroom should have the capability of cleaning and maintaining all the audiovisual equipment as well as other related equipment housed within the media center. However, many media specialists may prefer to limit upkeep and repairs to the small and simple ones.

Maintenance may include disassembling of equipment, cleaning, visual inspection, replacing some worn parts or bad components and reassembling. This type of maintenance (preventive maintenance) should be performed once a semester, or, depending upon utilization, at least once a year.

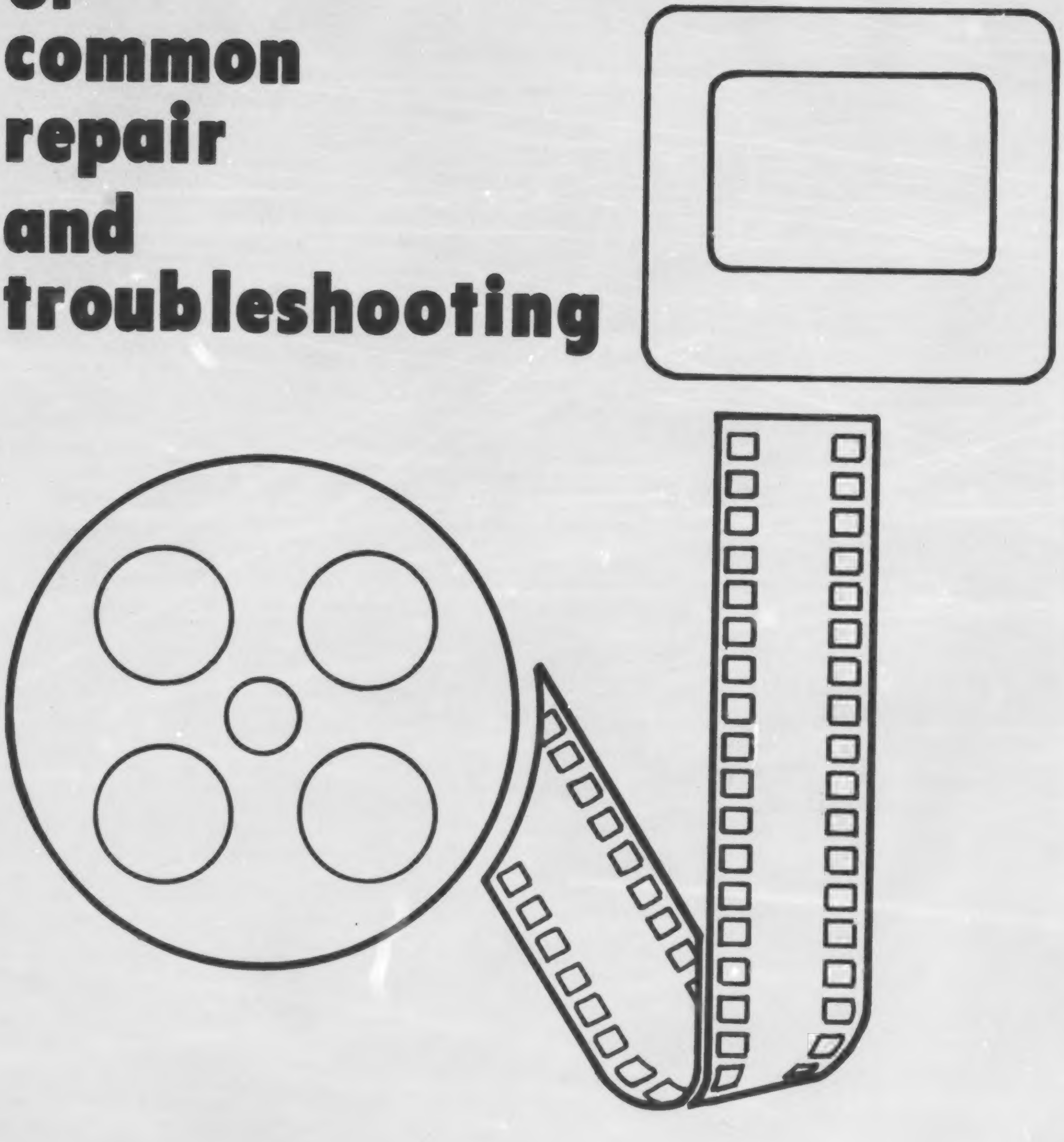
The extent of maintenance performed will depend upon the media specialist or technician. In most media centers the library media specialist will perform maintenance work. However, if student aids have the ability, they can assist or even perform the maintenance operation. If students maintain equipment, an inspection should be conducted by the specialist before the equipment is placed back into service. The student should report what the problem was, the solution, and what replacement parts were utilized. Remember, a record should be kept of all maintenance work performed.

If the media center is located in a large school system, the problem of maintenance may be delegated to a central office with a trained technician. This technician should have the time and the ability to perform more difficult repair and maintenance tasks.



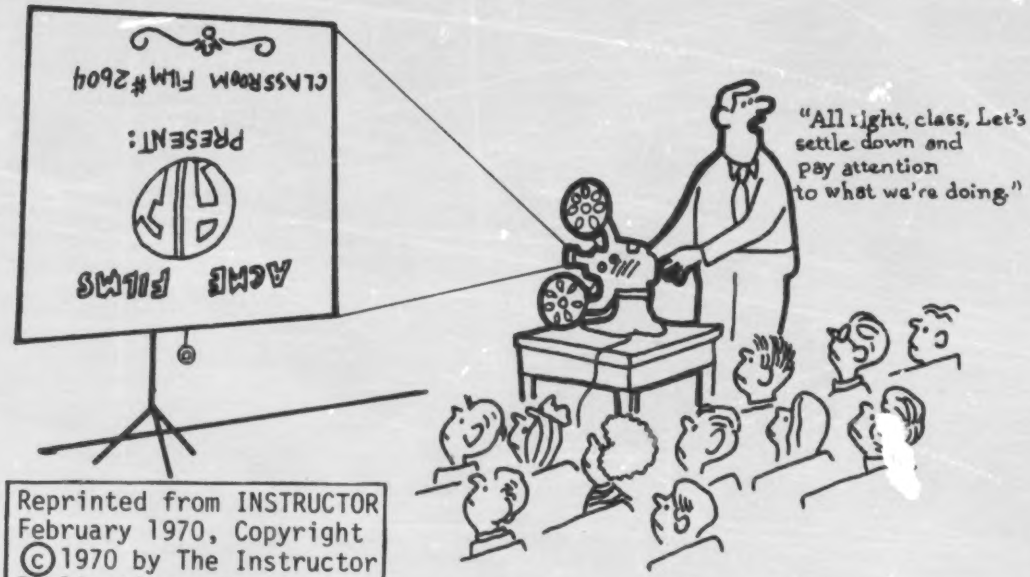
THE CARE AND FEEDING OF MISCELLANEOUS PROJECTORS AND VIEWERS

or
common
repair
and
troubleshooting



Care and Feeding Of Projectors . . .
Common Repair and Trouble Shooting

This chapter will deal with simple maintenance that can be performed by a school librarian or a media specialist. This guide is not intended to make everyone an electronics expert, but to serve as an aid in simple audiovisual maintenance.


CLASSROOM FILM #2604
PRESENT:
ACME FILMS
"All right, class, Let's settle down and pay attention to what we're doing."

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The following table specifies symptoms, problems, and solutions to some of the most common malfunctions of 16mm projectors.

The remainder of this chapter will describe techniques, procedures, and solutions for the problems noted in the tables, plus other helpful maintenance hints for audiovisual equipment problems that arise.

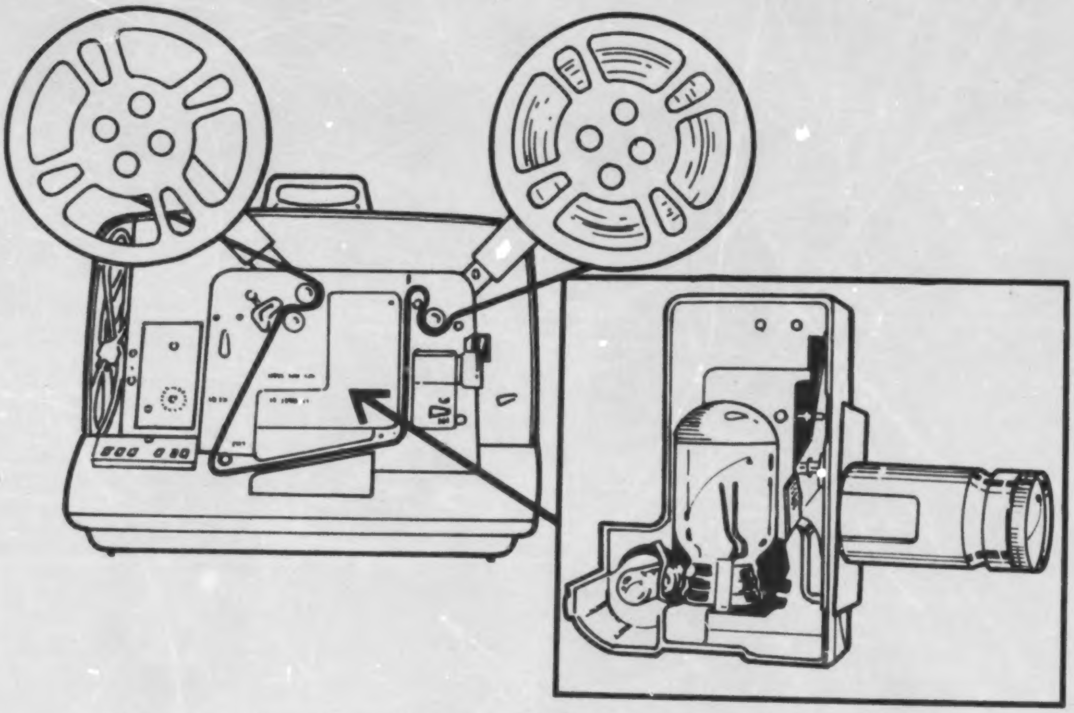
16mm PROJECTOR

SYMPTOM	PROBLEM	SOLUTION
I. Sound, but no picture	a. Lamp burned out	a. Replace lamp
	b. Lamp socket shortage	b. Replace socket /or/ Send to service center
	c. On-off switch malfunction	c. Replace switch /or/ Send to service center
	d. Bad wiring	d. Trace and replace bad wiring /or/ Send to service center
II. Picture, but no sound	a. Exciter lamp burned out	a. Replace lamp
	b. Tube failure	b. Check and replace tubes
	c. Speaker plug on jack shorted	c. Trace sound from speaker output to speaker and resolder shorted wire /or/ Purchase new jack
III. Volume and tone control noisy	a. Dirty contact	a. Spray volume and tone control with contact cleaner
IV. Projector operating at reduced speed	a. Speed control in wrong position	a. Change position
	b. Belt could be dragging	b. Check all belts and replace if necessary
	c. May need cleaning	c. Clean and oil

If not proficient in performing the suggested operations, refer to a trained technician.

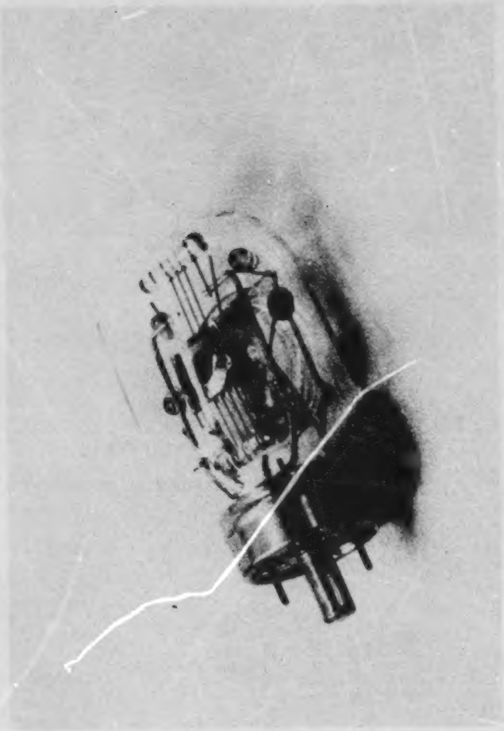
16mm Projector: Sound, But No Picture

As stated earlier, each 16mm projector has two projection lamps--a projection lamp (picture) and an exciter lamp (sound).



These two lamps will need replacing through the school year. This replacement is simple and can be accomplished in a matter of minutes.

The projector lamp (picture) is located toward the rear of the projector and is covered or enclosed with a lamp housing. At the top of the lamp housing is a forced air exhaust or opening to allow the forced air to escape over the lamp for cooling purposes. This lamp housing will come completely off, move to one side, or release and swing open. To gain access into this area, loosen a threaded screw.



To release a burned out lamp from the socket, pull up or turn and lift out. Some 16mm projectors have a lever to pull up which releases the lamp for easy removal. Other types of lamps must be pushed down and turned to release them from the socket. In the newer automatic or instant-load 16mm projectors, the lamp is called the Tru-Beam 2 Pin. This type simply slides into its socket. A wire catch fits up around the base and holds it securely in place.

CAUTION: Never immediately remove a lamp that has been in operation for an extended length of time. Projection lamps produce a tremendous amount of heat, and if touched, can produce a burn.

Other problems that may cause the projection lamp to malfunction are a shorted lamp socket, an on-off switch malfunction, or possibly bad wiring. If any of the above problems occur, and the media specialist is not experienced in using a drill, soldering iron, or replacing bad wiring, it is advisable to send the projector to a repair station or service center.

16mm Projector: Picture, But No Sound

The exciter lamp (sound) is the second lamp found in the 16mm projector. The exciter lamp will normally last twice as long as the projection lamp.

The purpose of the exciter lamp is to project light through a small lens onto the sound track of the 16mm film and then onto a photo-electric cell. This lamp will probably require changing only once throughout the school year.

The exciter lamp on the 16mm projector will normally be found below and a few inches in front of the objective lens (focusing lens). Like the projector lamp, the exciter lamp will be covered. This cover will not have an exhaust air opening; however, it will contain an opening so that the operator can see if the exciter lamp is burning. The exciter lamp cover is generally released in the same manner as the projection lamp cover. When a new lamp is inserted and the protective cover is replaced, the screw is then hand-tightened. The lamp itself will normally be constructed on a single contact prefocus base.[1]

Some 16mm projectors have an exciter lamp release. This release pushes the exciter lamp away from the socket so that it is easily removed by simply twisting to one side and lifting off. The replacement lamp is installed in a reverse procedure: insert, twist and lock down.

Older 16mm projectors may have tubes in the amplifier[2] portion of the projector. If the projector produces no sound, check each tube with a tube checker. If a faulty tube is found, discard the bad tube and replace it.

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[1] A type of lamp that is designed to fit into a lamp socket in only one way.

[2] Amplifies, increases the strength of incoming signals.

If a new projector has a transistor amplifier with faulty sound, and the exciter lamp is functioning, try this little trick to check sound. Aim the beam of a flashlight at the opening onto the photo-electric cell and move the beam of the flashlight up and down. If the transistorized amplifier is working, a thumping sound will be heard each time the flashlight beam hits the photo cell.

Look for other problems such as a dirty exciter lamp socket, a broken wire, or a shorted wire in the jack that is installed in the back of the projector for external speakers. If none of this accomplishes the reproduction of sound with the projector and you are not proficient with printed circuit boards, send the projector to a service center.

Some 16mm projectors have a threading lamp or bulb. This lamp is designed to allow the operator to thread the projector in semi-darkness. If this lamp burns out, normally no other related problems will occur. It will be a simple matter of ejecting the burned out lamp and replacing it with a new one. The operation manual will indicate the replacement number.

16mm Projector: Volume and Tone Control Noisy

Each 16mm projector has a volume and tone control as part of the sound adjustment on the projector. With repeated use dust will gather on the internal contacts of the control. When this occurs, the sound coming out of the speaker will be normal; however, as you turn either the volume or tone control up or down, additional scratchy noise will accompany the normal sound. In severe cases, the normal sound will jump from low to high without any midpoint in the volume range as the control is adjusted.

The solution to this problem is to spray the inner contacts of the control with contact cleaner. This cleaner comes in an aerosol can, along with a 5-to 6-inch plastic tube that attaches to the spray control on the can. By using the plastic tube the contact cleaner can be concentrated on the internal contacts of the control. Normally a small opening for such application is provided in the design of the control. If no opening is found, however, concentrate the cleaning solution on the opening in which the three wires are attached to the control. In a severe case, the control may need to be replaced. Consult with a service center.

16mm Projector: Projector Operating at a Reduced Speed

When a report is received that a 16mm projector is operating at a slow speed, it is not necessarily malfunctioning. Possibly the previous user showed a silent film and failed to switch the speed control back to the sound position.

This control, referred to as the silent-sound speed selector switch, is in various locations, depending upon the manufacturer. If this switch or lever is in the wrong position, a simple flip of the switch or repositioning of the lever will solve the problem.

If the projector in question is an older model and slow speed is reported, look for a loose belt. Through extensive use, the belt or belts may expand and be unable to grip or pull. This causes the projector speed to slow or even to stop. If no manual is located in your files for this old projector, contact a service center to see if new belts can be ordered.

With the newer 16mm projectors, the belts have been replaced by nylon or plastic gears. These gears have the same function as belts and help prevent maintenance problems.

The older 16mm projectors require a routine oiling, either once a year, or in some cases, once a semester. If the operator's manual for the old projector has been discarded by this time, you may need to oil the projector every semester. However, if the projector is still operating smoothly after a semester's use, do not oil until needed or until the end of the second semester. Use the recommended brand of lubricant for the older model projector secured from a service center. The newer 16mm projectors are manufactured with self-lubricating parts and should not require oiling, but they should be cleaned once a year at a service center.

Whether the projector is old or new it will require cleaning at least once a year. This cleaning should include a thorough brushing, or, if forced air is available, complete the following procedure: clean the film path;[3] remove both projector and exciter lamps to clean out their sockets, remove any excess dirt around the sound drum, rollers, sprocket teeth, and other moving parts.

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[3] The path that film takes through the projector.

16mm Projector: Film Splicing

When film breaks during showing, rewind or fast forward, match the break and run a piece of 1/2" wide masking tape (2" long) along the length of the film, across the break, being careful not to cover up sprocket holes. This masking tape will make it easier to find when repairing the film properly.

There are two methods of splicing and repairing film. One is a heat/cement splice, the other a cellophane tape splice. However, the heat and cement method will make a stronger splice. Both types employ a cutting tool and a metal plate with sprockets to hold the film.

When using the HEAT/CEMENT SPLICER, follow these steps:

1. Plug the splicer in a wall outlet and allow it to warm.
2. Determine which side of the film is the emulsion side, or the "ink" side upon which the actual picture is seen. By looking across the film at the proper angle, you can see the "grain" of the emulsion. If no "grain" is seen, this is the base side or shiny side. (As film runs through a projector, the emulsion side is away from the lamp, closest to the lens.)
3. With the emulsion side up, place the film in the right side of the splicer and lock it down with the top plate, making sure that the film is lined up with the sprockets. With the film locked in, the entire right side may be raised, with film still locked between the top and bottom plates. (A small portion of the damaged film should be sticking out beyond the plates. This will be trimmed later.)

4. Place the other end of film to be spliced in the left side, again with the emulsion side up, and lock it in place. (The film will be sticking out over a small ledge, approximately 1/16" wide.)
5. Lower the right side into position, then raise it again to trim both sides of the film to the proper length.
6. With a razor blade, or with the scraping tool attached, remove the emulsion from the film on the small ledge. All the emulsion must be removed from this area for the splice to hold properly.
7. Using the application brush attached to the lid, apply a thin, even coat of cement on the film where the emulsion was removed.
8. Quickly, with a firm motion, lower the right side into place, locking it down for approximately 10-15 seconds.
9. Unlock the plates and remove the film. A good, solid splice will not come apart under stress.

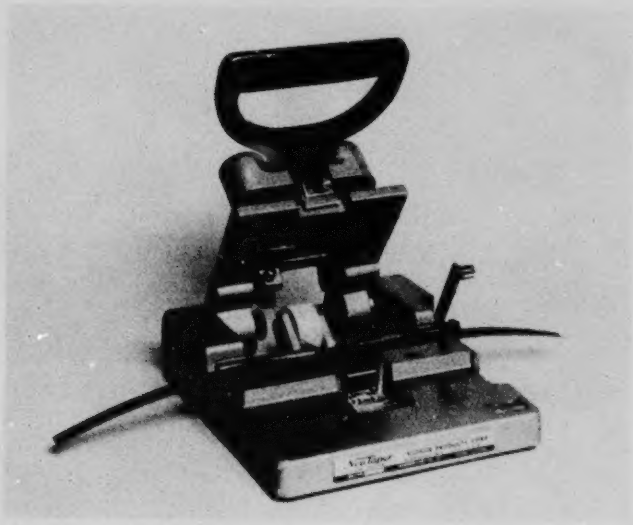
The TAPE SPLICE uses a similar splicer, but splicing tape is used instead of heat or cement. Follow these steps:

1. Both sides must be trimmed first. Line up the film, one side at a time, with sprockets. Using the trimmer on the right side of the splicer, cut away damaged film at a 90 degree angle.
2. On the splicing plate, line up the film, end to end, using the sprockets.
3. Pull a length of clear tape across the splice.

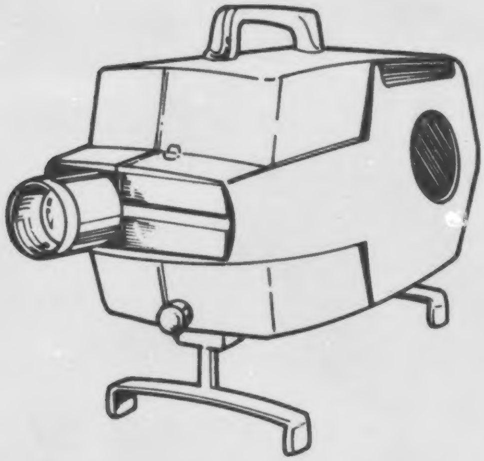
4. Pull down on the handle attached to the top plate, applying trimming pressure.
5. Move the plate back up, and remove film, from the splicer.
6. If necessary, turn the film over and repeat the taping and trimming procedure.

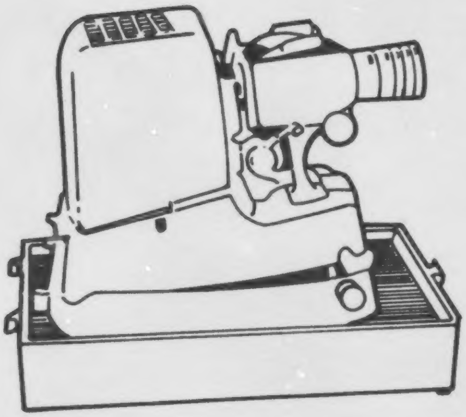
Some types of tape splicers trim the tape so that it may be folded back to tape the opposite side of the film. Both types of tape splicers re-cut the sprocket holes in the tape to align with the film.

Both heat/cement and tape splicers are available for Super 8 and Regular 8 film, but the tape slicer is more popular.



FILMSTRIP PROJECTOR





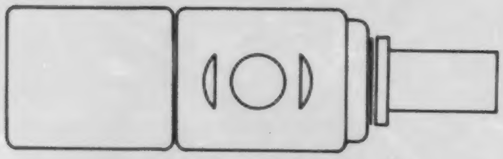
Filmstrip Projector: No Picture--Burned Out Lamp

As with the 16mm projector, the filmstrip projector has one main light source, a projector lamp. The lamp is positioned directly behind the film gate. The film gate is located where the filmstrip is inserted into the projector for viewing.

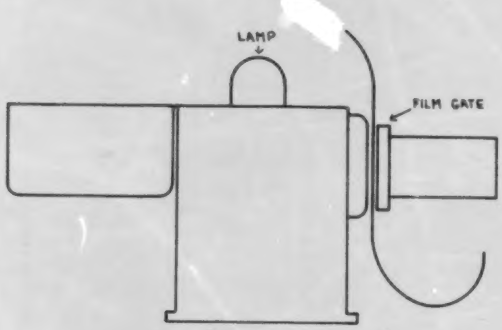
FILMSTRIP PROJECTOR

SYMPTOM	PROBLEM	SOLUTION
I. No picture	a. Burned out lamp b. Short in socket c. Check on-off switch	a. Replace lamp b. Replace lamp socket /or/ send to service center c. Replace on-off switch /or/ send to service center
II. Cooling fan not functioning	a. Check switch b. Check wiring c. Blower loose	a. Replace switch /or/ send to service center b. Send to service center c. Reposition blower, tighten screws
III. Remote control not functioning	a. Check short in advance control or wiring	a. Resolder any broken wires or shorted components /or/ Purchase new control
IV. Lens Breakage	a. Condensor lens break b. Objective lens break	a. Replace lens b. Replace lens

If not proficient in performing the suggested operations, refer to a trained technician.



TOP VIEW



SIDE VIEW

The projection lamp is surrounded by a metal housing or chimney. This housing retains the heat from the projection lamp in one area and thus prevents excess heat from damaging other parts of the projector which are in close proximity to the lamp. Another reason for the metal housing or chimney is to allow forced air cooling to be conducted under and around the projector lamp before escaping through an open vent in the top. Plan on changing the lamp after twenty-five to fifty operating hours.

Consult the operations manual for proper entrance into the lamp housing compartment. Once access has been gained, the lamp can be easily released from the socket by an ejection lever.

When the lever is pulled, pressure is automatically applied on the base of the lamp, forcing it free from the socket. After it is freed, simply lift the old lamp from the metal housing. CAUTION: If the projector has been in operation prior to lamp malfunction, it will still be very hot. Use a glove or cloth to remove the lamp.

To install the new lamp, remove it from its carton, leaving the protective paper or plastic cover around the envelope (glass portion) of the lamp. Place the new lamp in the lamp socket and turn the top with your fingers until the base drops into position and cannot rotate further. Press down gently on the lamp until it is seated firmly. Once inserted, remove the paper or plastic protective covering from the lamp envelope. NOTE: Oil from your fingers, transferred to the envelope of the lamp, will create a blister or bubble, causing the lamp to burn out before reaching its normal life expectancy.

After repositioning the lamp house compartment door, plug the electrical cord into a nearby wall outlet. Check to see that the lamp is operating properly.

Filmstrip Projector: No Picture--Shorted Socket
On-Off Switch Wiring

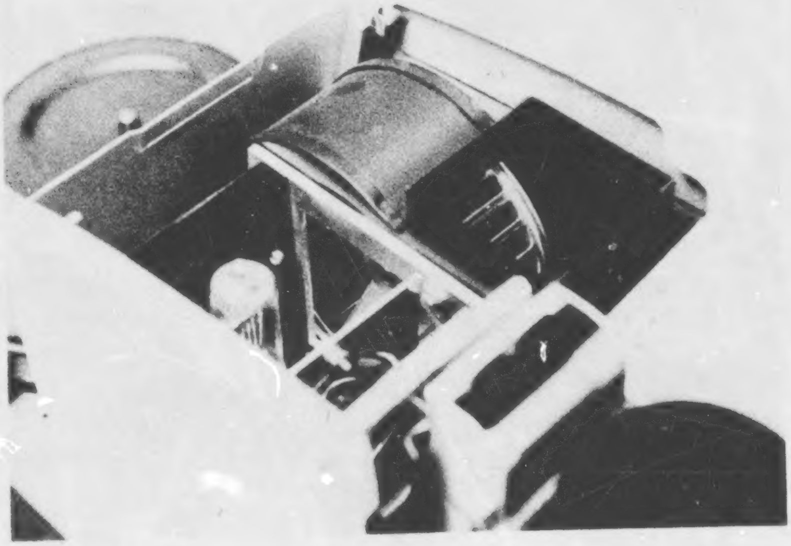
If a new lamp has been installed but fails to light, begin checking, a step at a time, to see if a solution can be found. First, check to see if electricity is reaching the projector by turning on the blower switch. If the blower functions, rule out the possibility of a faulty receptacle, power plug, or power cord. The remaining possibilities are few. Each filmstrip projector has either a switch for the blower and a switch for the lamp, or it may have one switch with all three positions: Off, Blower, and Lamp. If the blower functions, there are only three possible causes of the problem:

1. Bad switch on the lamp side of the switch.
2. Faulty wiring from the switch to the lamp socket.
3. Bad lamp socket--one pin burned off due to excess heat from the lamp and the amount of power drawn to the lamp.

If any of the above are suspected, refer the projector to a service center for repair.

Filmstrip Projector: Cooling Fan Not Functioning

As mentioned earlier, the function of the cooling fan is to produce air flow to cool the projection lamp. This flow is generally produced by a squirrel cage blower.



Problems that may occur in the operation of this cooling fan are:

1. If the on-off switch malfunctions, the cooling fan will not turn. The solution is to replace the switch.
2. If the cooling fan motor malfunctions, either from overheating, or lack of proper cleaning or lubrication (some cooling motors are self-lubricated), remove or gain access to the motor, clean and lubricate as needed. Consult your service manual for proper entrance into the motor housing.
3. With the blower turning at a high rate of speed to produce the needed air flow, the squirrel cage blower may come loose from the shaft. Consult the service manual for proper access to the blower compartment. Normally, there will be two screws holding the blower on the motor shaft. Reposition the blower as described in the service manual and tighten the two screws. Reassemble, and place back in normal operation.

Filmstrip Projector: Remote Control Malfunction

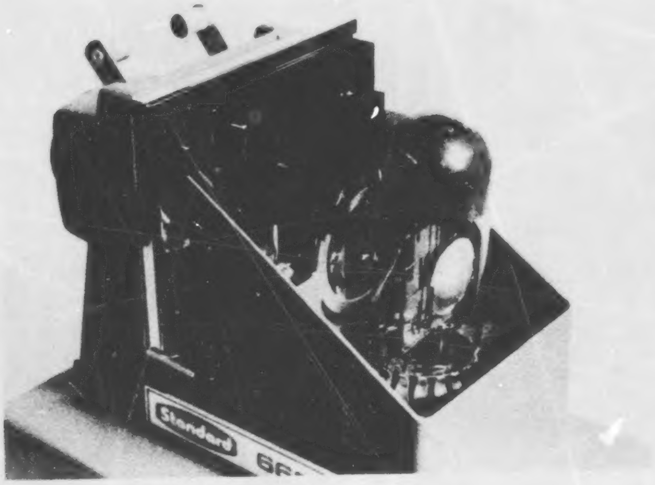
Automatic filmstrip projectors usually include a remote control to advance filmstrips and slides, allowing the operator to stand a distance away from the projector. The remote control unit consists of two switches in the form of a control box and a cord or line attached to the control box and to a plug which fits into the projector. This plug generally has five prongs. Unless experienced in electrical repair, when the remote control malfunctions, have it replaced or repaired professionally.

Filmstrip Projector: Lens Breakage--Condenser Lens

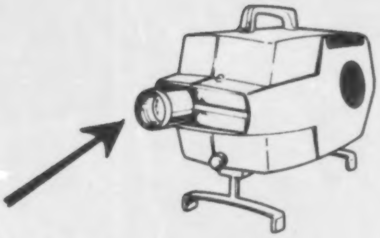
Throughout the life of any filmstrip slide projector there is a chance of breakage of the condenser lens or the objective lens. The condenser lens, located directly behind the film gate, actually consists of two lenses appropriately spaced and complimenting each other.

Between the two lenses is a heat-absorbing glass. This is also often referred to as a lens; however, its purpose is only to filter out heat, not to focus projected light. With newer projectors, the condenser lens may consist of a single lens and a heat filter.

The condenser lens, plus the heat-absorbing glass, usually lasts the lifetime of the filmstrip projector. If, however, these lenses are broken or damaged due to abuse to the projector, replacement will be necessary. Consult the service manual for proper entrance into this area of the projector. The lenses are generally housed within the projection lamp compartment.



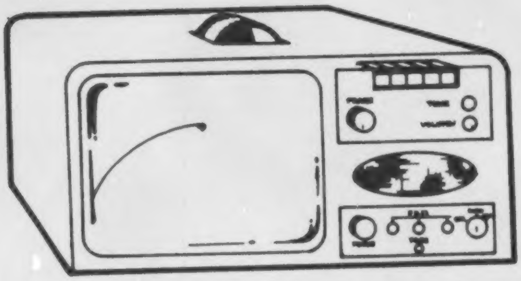
The lenses are held in place by a spring clip which prevents them from moving. Loosen the screw that holds the spring clip in place and allow the clip to slide up, releasing the pressure on the lens and the glass. Remove the damaged lens and replace it with the new lens or heat-absorbing glass.

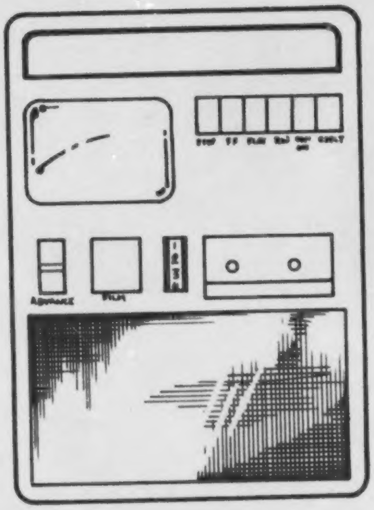


Filmstrip Projector: Objective Lens

The objective lens focuses the picture from the filmstrip onto the screen. As the projector is focused, the lens moves forward or backward causing the picture on the screen to focus. This lens will normally not fall out of its carrier, and is unlikely to be broken. However, if it is cracked or broken for some reason, consult the service manual for the proper order number. CAUTION: This lens comes in different sizes, F2.8, F3.5, etc. The size will be marked on the front of the defective lens. Check the proper "F" number before ordering.

SOUND/FILMSTRIP VIEWER





Sound/Filmstrip Viewer: No Picture

If the screen is dark when the viewer is turned on, the lamp may need to be replaced. First, disconnect the power cord. Access to the projection lamp is gained in different ways on different viewers. On one model the cover is held on by two screws which must be removed. (Do not overtighten the screws when replacing the cover.) On another model, slide the lock of the lamp access door to the left to open the door.

On one model the lamp is removed by pushing in and turning counterclockwise. In another model move the lamp release lever toward the rear of the projector to release the lamp. Slide the lever back to its normal position and remove the lamp.

CAUTION: ALLOW THE LAMP TO COOL PRIOR TO REPLACING. LAMPS ARE

SOUND/FILMSTRIP VIEWER

SYMPTOM	PROBLEM	SOLUTION
I. No picture	a. Burned out lamp	a. Replace lamp
II. Fuzzy picture	a. Dust, dirt on screen, lens	a. Clean by using compressed air.
III. Faulty Sound	a. Playback or recording heads dirty	a. Use commercial cleaning tape/or/clean with denatured alcohol

VERY HOT DURING AND IMMEDIATELY AFTER USE.

Unwrap the new lamp and carefully position it in the socket so that the center prong lines up with the groove in the socket and the collector grid is at the top. Avoid handling lamps to prevent baking fingerprint stains on the surface. Be sure that the lamp is seated fully in the bottom of the socket.

Sound Filmstrip Viewer: Cleaning

Keep all audiovisual hardware as free from dust as possible. Clean recording and playback heads regularly. Use commercially available cleaning tape or moisten a clean cotton swab with denatured alcohol (Isopryopyl) and wipe head carefully. Do not use sharp objects that will scratch or mark the head. To clean rollers and belts, use a rubber revitalizer. Follow the manufacturer's directions for proper use.

35MM SLIDE PROJECTOR

35mm Slide Projector: No Picture--Burned Out Lamp

A slide projector, like a filmstrip projector, contains one main light source, the projection lamp. However, unlike the filmstrip projector, it has one on-off switch to operate the blower and the lamp. The switch usually has three positions: Off, Blower, and Lamp. Some switches have "High Lamp" and "Low Lamp".

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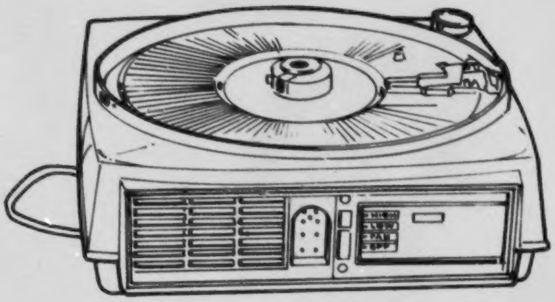
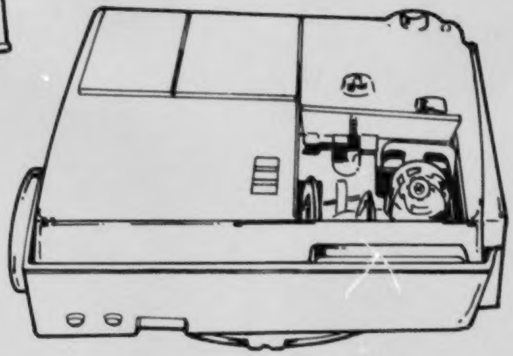


TOP VIEW



BOTTOM VIEW

The lamp compartment for some projectors is on the rear, the side, or underneath, depending upon the manufacturer. The replacement lamp is labeled with letters (e.g., DEK). Consult your operating manual for the correct lamp.

If the slide projector does not have a lamp release lever, grasp the top of the lamp and gently pull. CAUTION: If the lamp is still warm, use a glove or cloth. After the new lamp is installed, close the lamp compartment door and resume normal operation. In some slide projectors the lamp compartment also houses the condenser lens which may tumble out and break if the lamp compartment door is left open when the projector is turned upright.

35mm Slide Projector: No Picture--On-Off Switch

This on-off switch, with frequent use and age, will cease to function properly, or will short out. If this problem occurs, the

35mm SLIDE PROJECTOR

SYMPTOM	PROBLEM	SOLUTION
I. No picture	a. Burned out lamp b. On-off switch	a. Replace lamp b. Have on-off switch replaced
II. Remote Control	a. Non-function	a. Replace or repair remote control unit /or/ Send to service center
III. Cooling fan	a. Non-function	a. Clean and lubricate b. Replace belt
IV. Unit completely non-functional	a. Check thermal fuse	a. Replace fuse /or/ Send to service center
V. Lens breakage	a. Broken or cracked lens	a. Replace lens
IV. Exterior parts	a. Broken or cracked exterior parts	a. Replace exterior parts

If not proficient in performing the suggested operations, refer to a trained technician.

only recourse is to replace the entire switch. Unless you are experienced with this type of repair, send the projector to a service center.

35mm Slide Projector: Non-Function Remote Control

The remote control on the slide projector operates in much the same way as on the filmstrip projector. If it malfunctions, repair or replace it.

35mm Slide Projector: Cooling Fan

Again, the purpose of the cooling fan is to remove heat from the lamp compartment and cool the inside of the projector. If for some reason the cooling fan stops functioning, certain parts of the projector will become overheated and melt, due to the tremendous amount of heat produced by this lamp.

The motor which operates the cooling fan will also provide power for the mechanism advancing each slide and for the movement of the tray holding the slides.

This motor should be cleaned, removing lint and dust from any moving parts. A non-self-lubricating motor should be lubricated at least once a year. CAUTION: Never apply oil to belts. Oiled belts leading from the motor to the blower may expand and become weak, causing the blower to operate improperly.

Once a year the belt from the motor should also be checked, and, with any sign of wear, it should be replaced. If the belt breaks during operation and no exhaust air is felt, shut the projector off and let it cool. Consult the service manual to gain entrance into the blower compartment and motor, remove the broken belt, and replace it.

It is best to replace parts with only the suggested manufacturer replacement parts. Even though a substitute might be found, the part designed by the company will meet requirements for the equipment more efficiently.

Normally the blower will be of the squirrel cage type. It should be well lubricated at least once a year, sometimes twice a year, depending upon the utilization of the projector.

If the blower becomes noisy in operation, check for malformed or broken ribs on the squirrel cage causing a fluttering noise. Clean and oil, or replace the blower.

35mm Projector: Completely Non-Functional

A safety device on any piece of equipment is a fuse.[4] A fuse, or in this case, a thermal fuse, will be found on some models of slide projectors. The thermal fuse protects the projector from damage if the blower should fail. If the cooling fan or other parts of the cooling system fail, the projector will stop running and cannot be turned back on. This is a good indication that the thermal fuse has blown. Send the unit to a service center.

35mm Projector: Lens Breakage

The slide projector also has a condenser lens and an objective lens. The condenser lens condenses the light from the projector lamp through the lens onto the slide. It can be broken from excess heat or from abuse, such as dropping the projector or accidently dropping the lens while the lamp compartment door is open.

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[4] A short piece of wire within a glass tube, that will melt or break when the current exceeds the rated value.

The objective lens is positioned at the front of the projector. Some manufacturers provide a cover for the objective lens. This is an automatic function that protects the lens from dust and abuse when the projector is not in use. If the objective lens breaks, consult the service manual for the replacement number and order the part.

To release the objective lens, turn the focus control so that the lens is focused to the fartherest point from the projector. Pull on the barrel of the lens to completely release it from the projector.

To insert the new objective lens, which contains both the lens and barrel portion, push the lens barrel into the lens opening of the projector. Make sure the grooves on the side of the lens barrel match the focusing knob to complete the installation.

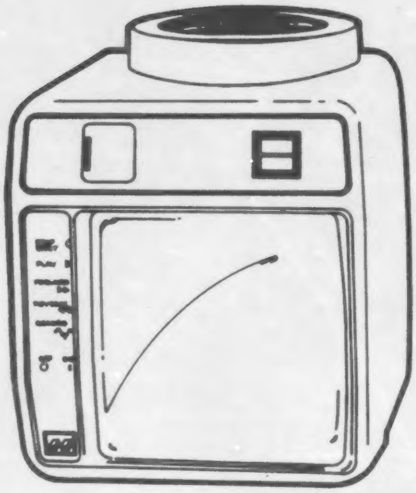
35mm Slide Projector: Exterior Parts

With every slide projector there are exterior parts such as rubber feet, dust corners, etc. These parts may come loose and in some cases be lost.

If this happens refer to the pictured drawing in the service manual. Identify the part from the drawing, refer to the part number and order a replacement. It is a good idea to order two or three extras.

35MM SOUND/SLIDE VIEWER/PROJECTOR

35mm Sound/Slide Viewer/Projector: No Picture



Before replacing the lamp in a sound/slide viewer/projector, remove the power cord from the electrical outlet. Open the access door in the rear of the viewer. Pull the lamp straight up. CAUTION: LAMP MAY BE HOT. Align the ridge on the center pin of the replacement lamp with the groove in the socket. Push down firmly until it is seated fully.

35mm Sound/Slide Viewer/Projector: Cleaning

For periodic cleaning of the recording or playback heads use a commercially available cleaning tape. You may also clean the heads by moistening a clean cotton swab with denatured alcohol (Isopropyl) and wiping the head carefully. Do not use any sharp objects that will scratch or mark the head. To clean rollers and belts, use a rubber revitalizer. Follow the manufacturer's directions for proper use.

Blow dust and dirt from the viewer with compressed air (available in canisters at a reasonable price).

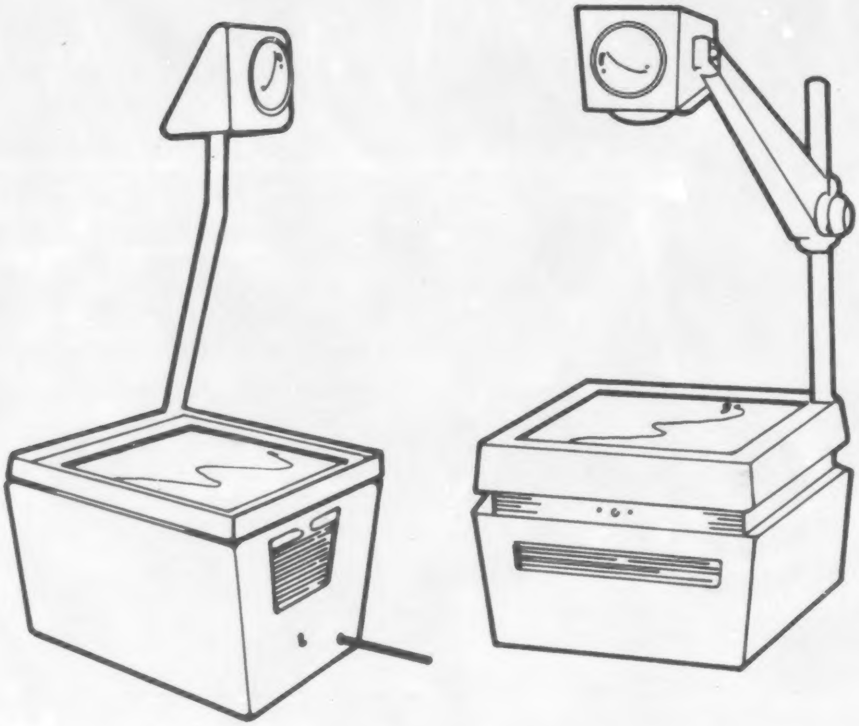
35mm SOUND/SLIDE VIEWER/PROJECTOR

SYMPTOM	PROBLEM	SOLUTION
I. No picture	a. Burned out lamp	a. Replace lamp
II. Fuzzy picture	a. Dust, dirt	a. Clean by using compressed air
III. Faulty sound	a. Playback or recording heads dirty	a. Use commercial cleaning tape/or/clean with denatured alcohol

OVERHEAD PROJECTOR

Overhead Projector

The overhead projector has been described as the most versatile of all audio-visual equipment. Overhead projectors can be found in about every public school in the United States. The operation of the overhead projector is very simple, with only a few problem areas that cause the projector not to function properly.



Overhead Projector: No Light On Screen

The most common type of failure that occurs with the overhead projector is projection lamp burnout. The steps to replace this lamp are very easy. First, disconnect the power plug from the electrical outlet. Second, gain access into the lamp compartment.

OVERHEAD PROJECTOR

SYMPTOM	PROBLEM	SOLUTION
I. No light on screen	a. Burned out lamp	a. Replace lamp
	b. Short in socket	b. Replace lamp socket /or/ Send to service center
	c. Check on-off switch	c. Replace on-off switch /or/ Send to service center
II. Dark around corners on screen	a. Dirty glass on stage	a. Clean glass
	b. Fresnel lens pulling apart	b. Replace fresnel lens
III. Cooling fan not functioning	a. Check wiring	a. Replace bad wiring /or/ Send to service center
	b. Check thermostat	b. Replace bad thermostat /or/ Send to service center

If not proficient in performing the suggested operations, refer to a trained technician.

The older overheads require opening an access door generally located in the front of the projector. Pull the release knob (plunger[5]) and the door should release itself laying flat, or completely detaching.

The protective covering (chimney) over the lamp must be moved up to one side in order to remove the old lamp. After removing the old lamp, replace it with a new lamp and place the chimney back over the lamp. Be sure the replacement is the manufacturer's recommended lamp. Close the access door and continue normal operation. Since some projectors will not operate with the access door open, make sure it is completely shut.

CAUTION: THESE LAMPS GET EXTREMELY HOT, THEREFORE, IF POSSIBLE, LET THE DEFECTIVE LAMP COOL BEFORE REMOVING IT.

In later model overhead projectors there is no access door to open. Instead, release and move the release lock lever to the unlock position and raise the stage, exposing the lamp, lens and wiring.

If the projector has a condenser lens covering the lamp, simply pull down on the bracket holding the condenser lens and lift up, exposing the lamp. A lamp holder may hold the lamp in place. Pushing down on the lampholder will eject the lamp from the socket. Once the lamp is released push the lampholder back into its normal position. If this is not done, a new lamp will not fit into the socket.

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[5] A knob that holds the access door in position.

Never touch the overhead projector lamp with your fingers. Always use the protected paper or plastic covering that comes with the new lamp. After the new lamp is installed remove the protective cover and reassemble the projector for operation.

Once the lamp is installed, place the condenser lens back over the new lamp and secure the bracket holding the lens in place. Reposition the stage and place the locking lever in lock position. Some projectors will not operate without the lock lever being locked.

Overhead Projector: No Light On Screen--Short in Lamp Socket

Because of excess heat produced by the projector lamp, the lamp socket may break, or one of the wires may become separated from the lamp socket. If this occurs replace the entire lamp socket.

Overhead Projector: No Light On Screen--On-Off Switch

With a great deal of use, the on-off switch may become defective. When this happens refer to the service manual for the part number and order a replacement. When the replacement switch arrives, gain access blower into the overhead projector through the access door or by lifting the stage of the projector.

The old switch will generally be held in place with two screws. Loosen the two screws and lift out the old switch. Attached to the switch will be several wires, which will be of the pull-apart configuration. To make sure of the exact wire location, draw a diagram of the defective switch and the location of each wire. Remove the defective switch, and reconnect the wires to the new switch.

The service manual may have a drawing with the location of each wire labeled and color coded.

After the new wires are attached, reposition the new switch on the projector in the same manner as the old switch. Attach the two nuts and bolts and reassemble, completely resuming normal operation.

Overhead Projector: Dark Around the Corners On Screen

If the overhead projector is used extensively, it will be necessary to clean the stage periodically. Simply wipe the stage area with a clean damp cloth and polish with a clean dry cloth.

If dark corners are still seen on the screen, the fresnel lens may have become defective. As with other defective components, refer to the service manual for the correct part number and order the fresnel lens. Installation of the fresnel lens can be a simple task, depending upon the age of your overhead projector. First draw a line down one side of stage onto the base of the projector with a grease marking pencil. This mark will allow the stage to be replaced in exactly the same position as before. Repositioning the stage this way also focuses the machine and saves the time of refocusing.

If you have an older overhead projector, gain access into the projector in the same manner as for the replacement of the projection lamp. Directly under each corner of the access door will be found a bolt with a nut head. Use a nut driver (a tool used to tighten and loosen nuts) to loosen each bolt and pull forward, thus releasing the stage from the projector. Remove the stage and finish loosening the bolts completely. Remove the [illegible] fresnel lens and lay aside.

Remove the new fresnel lens from its carton. On one side of the lens is a sticker labeled "LAMP SIDE". This side of the lens focuses the lamp compartment. Place the fresnel lens on the stage positioning the lamp side sticker appropriately. Replace the four bolts but do not tighten. Place the stage back on the overhead projector and adjust the position of the stage to match the grease pencil marks. Finish tightening the bolts from within the projector and close the access door.

If you have a newer model overhead projector, much of the operation described above will be eliminated. First, place the locking lever in the unlock position and raise the stage completely to its highest level. On the bottom side of the stage will be found two wing nuts or one side nut. Loosen the nuts and the fresnel lens should come out.

Take the new lens out of its carton remembering the lamp side sticker and replace in exactly the same manner as the old one. Reposition the wing nuts and tighten hand tight. Close the stage on the back of the projector and reposition the locking lever to the locked position. This completes the installation.

Overhead Projector: Cooling Fan

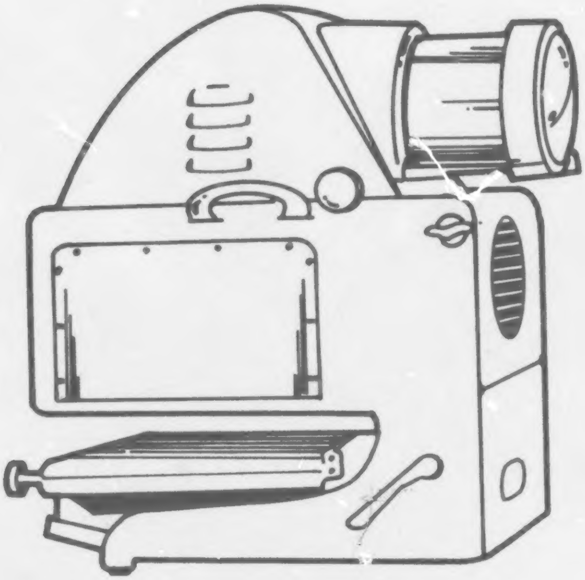
Within the overhead projector is a cooling fan to exhaust heat from the projector. The cooling fan unit consists of a fan and motor.

Some overhead projectors have self-lubricating motors. However, depending on the age of the overhead projector, the motor should be lubricated at least once a year. The only required cleaning will be to clear away the dust and lint from around the motor assembly and fan. Should the motor become defective, it is advisable to consult with a service center for replacement.

OPAQUE PROJECTOR

Opaque Projector

The opaque projector enlarges drawings, pictures and other printed material onto a screen or wall for classroom use. It operates through a light source on to several mirrors, which direct the light onto a sheet or book. The light from the paper or book is reflected onto a large mirror which is positioned at a forty-five degree angle and directed through a projector lens onto a viewing surface.



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OPAQUE PROJECTOR

SYMPTOM	PROBLEM	SOLUTION
I. No light	a. Projector lamp	a. Replace lamp
	b. On-off switch	b. Replace switch /or/ Send to service center
II. Inadequate light on screen	a. Dust around mirror surface	a. Clean mirror surface and clean lens
III. Projector noise	a. Projector produces too much noise or vibration	a. Tighten all nuts and bolts, lubricate motor and all moving parts

If not proficient in performing the suggested operations, refer to a trained technician.

Opaque Projector: No Light

With periodic use the lamp, which is between 500 and 1000 watts, will burn out. When this occurs, it is a simple matter to replace.

First, open the access door and locate the lamp. If the projector has been in use it is advisable to let it cool before attempting to remove the lamp.

Normally the lamp will be seated in a prefocus base, meaning that the lamp will fit into the socket in only one way. To remove the lamp, push down and twist, causing the lamp to eject from the socket. To install a new lamp, simply place it on the socket and twist until it sinks properly. Close the access door and resume normal operation.

Opaque Projector: On-Off Switch

If the projector fails to operate after the new lamp is installed, this could indicate the on-off switch has become defective. Unless you are experienced in this type of repair, take the projector to a service center.

Opaque Projector: Inadequate Light On Screen

As mentioned, opaque projectors operate with a large light source, several mirrors, and a lens. The blower blows constantly while the machine is in operation and picks up lint and dust from the classroom. This lint and dust collects around the mirrored surfaces causing the light reflected off the mirrors to become diffused. Periodic cleaning with a cloth on and around the mirrored surfaces prevents loss of much needed light for the projected material. Another item which needs cleaning is the objective lens or focusing lens. This lens should be removed from the projector and the front and back of the lens cleaned with either lens cleaner or lens tissue. Once the lens is cleaned, reinstall and resume normal operations.

Opaque Projector: Noise

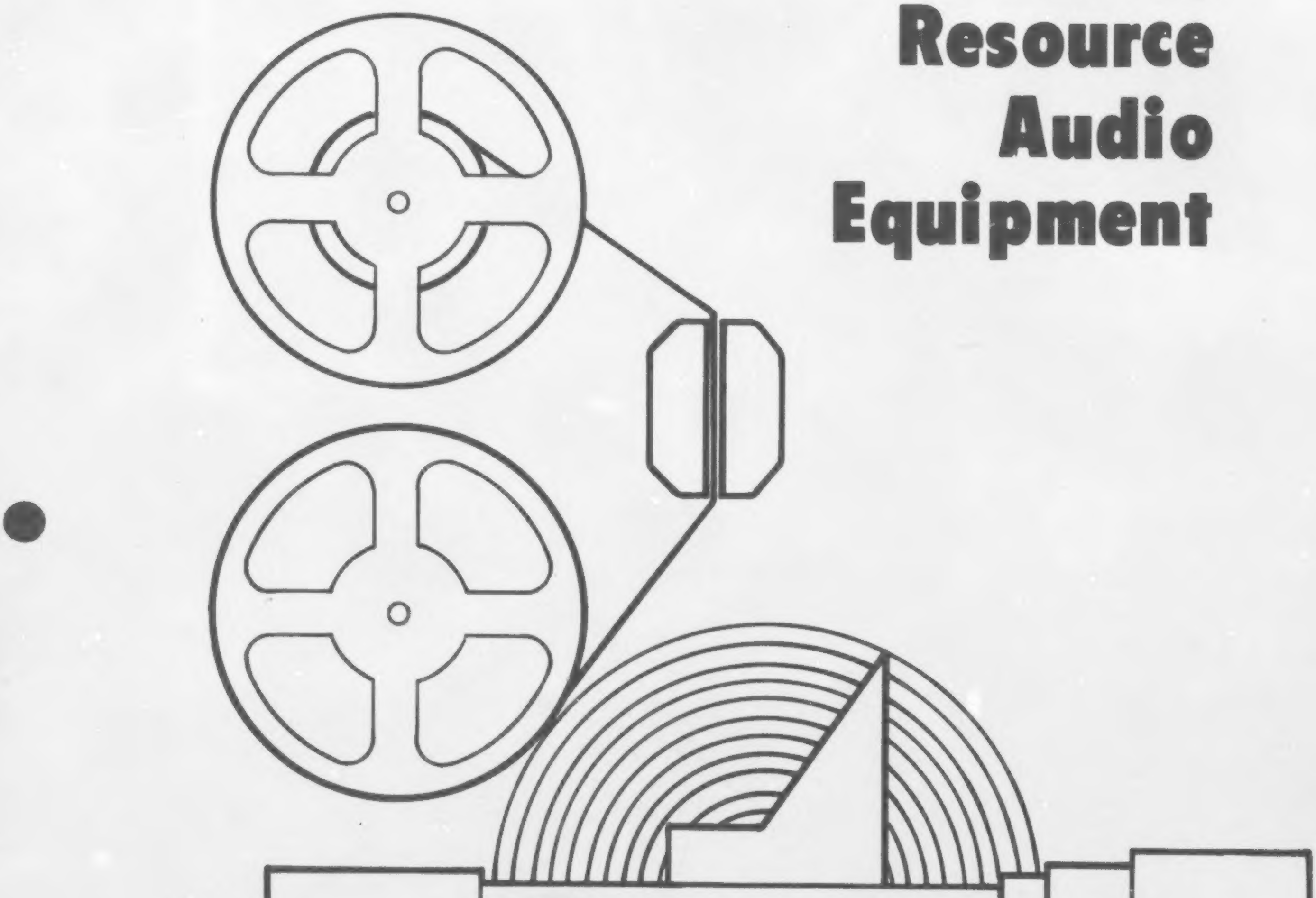
With age the opaque projector may produce unwanted noise. To solve this problem make sure all glass and reflectors are fastened tightly. This may be a simple matter of tightening a wing nut or a loose bolt holding the glass or reflector in place.

The older models may have an electric motor that requires lubrication. To lubricate, place a few drops of electric motor or projector oil in the openings provided for such lubrication. Check the service manual for the correct location and lubricate at least once a year. If a service manual is not found, check the motor housing for one or two holes and place a few drops of oil in the holes to see if the motor noise stops.

Some openings in the projector may have springs that require lubrication to prevent squeaking. For these, purchase an all-purpose white lubricant for springs and squeaky moving parts from an auto shop.

Pieces of paper may have been stuck around the blower assembly during use. If this occurs use a piece of wire or another long device to pull the paper from around the blower housing.

Care And Feeding Of Learning Resource Audio Equipment



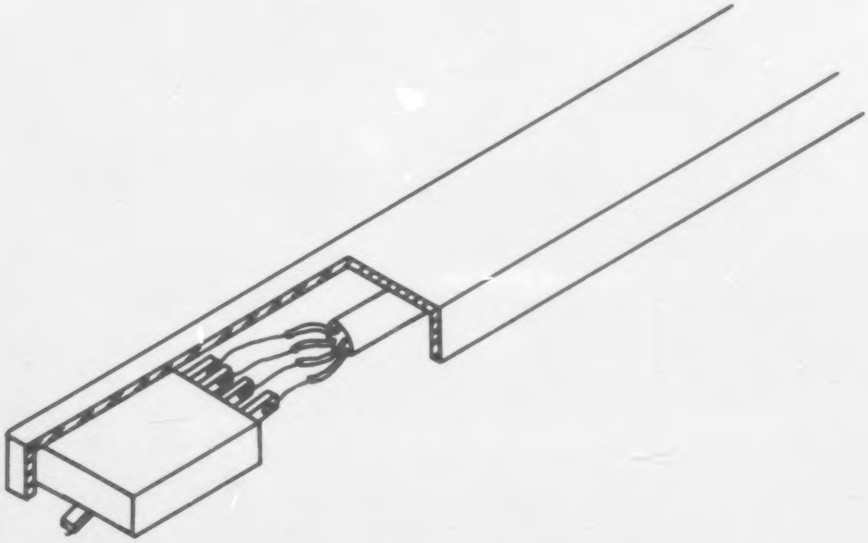
Care and Feeding Of Learning Resource Audio Equipment

RECORD PLAYER

Nearly all record players that are manufactured today use transistors to produce amplification or sound from the speaker. Described here are several maintenance problems that may occur with this type of record player along with how to repair each problem.

Record Player: No Sound

Each record player contains a tone arm that moves back and forth across the record. Attached to the tone arm is a device called a cartridge, to which the stylus or needle is connected.



With use, the cartridge or stylus may come loose from the holding device. The cartridge may be so designed that it simply fits into a holding bracket and may jar loose, thus producing no sound from the speaker.

To remedy this problem, first, raise the tone arm of the record player to expose the holding bracket. Second, grasp the cartridge, being careful not to make contact with the stylus or needle, and push the cartridge back into its holding bracket. Most cartridges will come with an indicator mark to align the cartridge and holding bracket so that it will fit into position properly. Do not force the cartridge into the bracket. If it does not fit properly, check to see that there is no obstruction preventing it from entering the holding bracket. Also make sure it is aligned properly. Once the cartridge is aligned and in position lower the tone arm and turn on the record player for operation.

In some cases the cartridge may become defective so that no sound is emitted from the speaker. To check for a defective cartridge turn on the record player turning the volume control up to its highest position. Raise the tone arm exposing cartridge and stylus. Extending from the holding bracket are two or four wires which lead down the tone arm, going into the base of the record player.

Touch your finger to one of the exposed wires at the point where the wires make contact with the bracket. If you should hear a loud buzzing noise from the speaker, you can assume that the cartridge has become defective and needs to be replaced.

RECORD PLAYER

SYMPTOM	PROBLEM	SOLUTION
I. No sound	a. Cartridge loose from tone arm	a. Reposition
	b. Stylus loose from cartridge	b. Reposition
	c. Defective cartridge	c. Replace
	d. Loose wire connected to cartridge	d. Reposition
	e. Speaker wire loose	e. Reposition
II. Sliding tone arm	a. Defective stylus	a. Replace
	b. Adjustment to tone arm	b. Adjust
III. Non-functional record player	a. Defective fuse	a. Replace
IV. Distorted sound	a. Check record	a. Replace
	b. Defective speaker	b. Replace
	c. Defective cartridge	c. Replace
V. Erratic turntable speed	a. Idler wheel	a. Replace
VI. Non-functional Tube Model record player	a. Defective tube	a. Replace

From the service manual or operating instructions obtain the correct part number and order. Once the replacement part arrives insert and resume normal operation.

Another possible reason for no sound coming from the speaker is that one of the wires may have separated from the cartridge. A visual inspection of the exposed tone arm and bracket or cartridge will reveal the broken wire. Normally the wire will be attached with connectors to the bracket or cartridge.

If a connector comes loose from the bracket or cartridge simply grasp the loose connector and slip it on the exposed pin, thus completing the circuit, and resume normal operation. If the cartridge is in a confined location, it is adviseable to use a pair of sharp nose pliers to place the connector back on the pin.

In most record players the wires leading from the tone arm to the cartridge will be soldered to a connector or cartridge. If a wire becomes separated or broken, use a low wattage soldering iron to solder the wire back onto the connector or cartridge.

Record Player: Distorted Sound

After the record player has been in use the sound coming from the speaker may become distorted. There are three possible problems that may cause this.

The first may be the record. If a record sounds distorted, play one that you know is good. If the second record sounds distorted possible problems are either a defective speaker or a defective cartridge. A defective speaker can be easily checked. Most record players contain an auxiliary speaker output. Connect an auxiliary speaker to the record player and try the player for sound. If the sound is still distorted, the problem will usually be a defective cartridge. Consult the operating guide or service manual for the proper part number and replace as described earlier.

The stylus is designed so that it may simply be inserted into the cartridge. If the stylus jars loose from the cartridge it is a simple matter to insert back into the cartridge. Once again raise the phonograph arm and expose the cartridge. Grasp the stylus at the tooth tabs and align the key or alignment mark on the stylus with the slot in the cartridge and insert. Since styli are manufactured in many different ways, consult the operating manual for the proper replacement procedure.

CAUTION: AVOID CONTACT WITH THE ACTUAL PLAYING
TIP OF THE STYLUS.

Lower the arm back into position, turn on the record player and check for operation. All record players may not be designed as described above. To insure the proper method of reinsertion of cartridge and stylus, check with the service manual or operation guide.

Some record players have an adjustment for the tone arm to vary the amount of pressure to the stylus. If this is not adjusted correctly, the tone arm may slide across the record.

First check the stylus, then adjust for proper pressure to the tone arm. Consult the operation or service manual for proper adjustment.

When the tone arm slides across the record, this may also indicate that the tip of the needle or stylus is worn or broken off. To remedy this problem, replace the needle or stylus.

Record Player: Erratic Turntable Speed

The record player turntable obtains its thrust from a motor. This motor rubs up against a small wheel referred to as an "Idler Wheel." The idler wheel rubs against the back of the turntable causing it to rotate.

The idler wheel has a layer of rubber that applies pressure from the motor to the back of the turntable, causing all three components to rotate together. The rubber on the wheel, after long periods of use, will wear down or become smooth and cause the turntable to rotate improperly. A record played on the defective record player will sound slow or erratic.

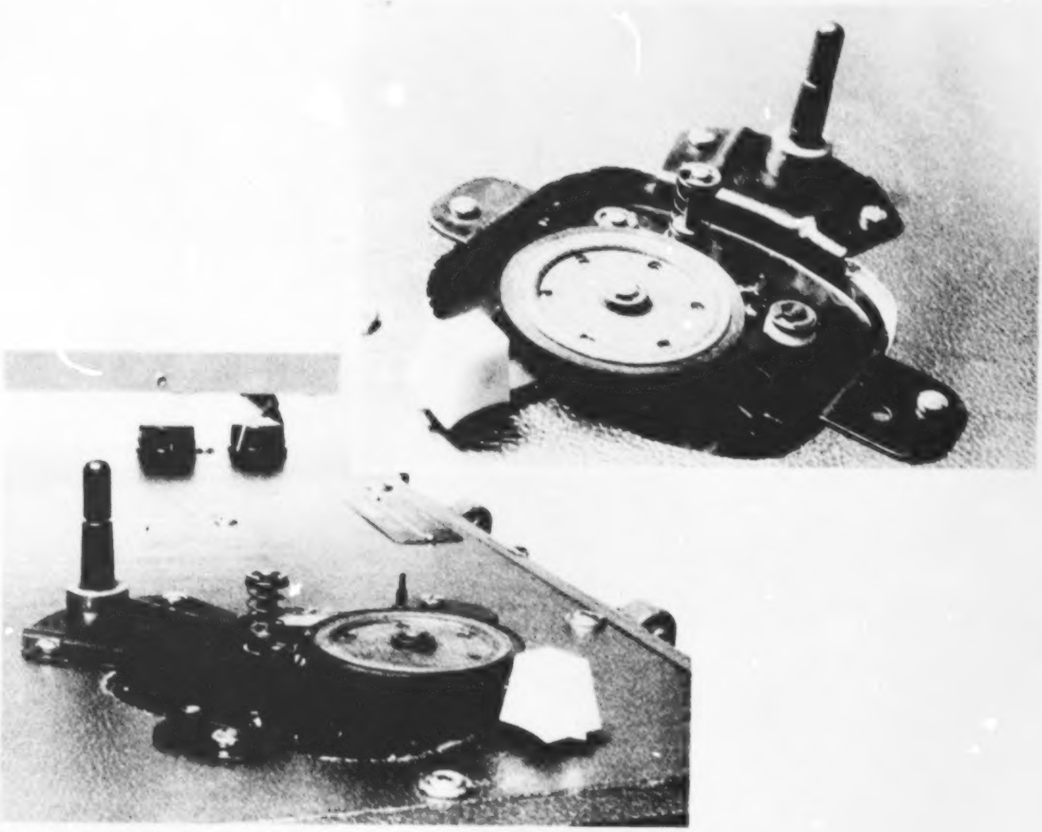
To solve this problem, the idler wheel must be replaced. Consult the service manual for the correct part number and order.

To gain access into the motor-idler wheel compartment, the turntable must be removed from the record player. A holding clip will be found in the center of the turntable. This clip or ring must be removed to allow the turntable to release from the turntable shaft. Once the turntable is removed, you will see the motor and the idler wheel.

If the idler wheel has a holding clip, remove this clip and the idler wheel. Before inserting the new wheel, lubricate with a drop of fine oil onto the shaft. Replace the new wheel and reassemble. The turntable may not fit correctly until the idler wheel is pushed back with your finger and the turntable is set over the wheel.

Remember, the idler wheel is spring loaded. Place the holding clip back on the shaft and try out the player.

There is another solution to the problem of slow speed. When the idler wheel is lifted out of the mechanism, buff the outer edge of the wheel with fine sandpaper. Clean the back of the turntable, disposing of any foreign materials. Lubricate the shaft and reassemble. This may preclude the replacement of the idler wheel. However, it is advisable to replace this wheel later on.



Record Player: Fuse

Only the external possible problems of no sound coming from the speaker have been discussed at this point. However, there are also internal problems.

Nearly all transistor record players contain a fuse. A fuse is a piece of wire in a small glass tube designed to handle only a certain amount of wattage. If for any reason the equipment draws more wattage through a malfunction, the wire in the small glass tube will become extremely hot and separate, causing the equipment to cease functioning. Depending upon the manufacturer, this fuse can be in a number of locations.

Some manufacturers design their record players so that the fuse is wired inside with the amplifier and motor. Others place the fuse in a holder located in a position which allows easy access for inspection. This location may be under the record player or in the back.

Some fuse holders are designed with a screwdriver slot knob, requiring a screwdriver to release the slotted knob. There may also be a spring tension in back of the assembly. The fuse and slotted knob will pop out for visual inspection.

Others are designed with a bayonet knob. With this type one simply twists the knob, with spring tension, the assembly pops out for visual inspection.

Once it has been determined that a fuse is defective, simply replace it. The number, which is listed on the metal ring, indicates the amount of ampere the fuse will carry before it burns up and separates.

Do not exceed the rating listed on the fuse. Sometimes a fuse will blow out for no apparent reason. If this happens simply replace it. If, after a new fuse is inserted, the fuse blows out again, take the defective record player to a service center for repair.

Record Player: No Sound, Motor Will Not Function

Another problem that occurs with record players when no sound emits or the turntable will not function, may be due to malfunctioning of the AC power cord.

With the newer models of record players the AC power cord is molded onto the plug that fits into the wall. With use the wires inside the plug may break or separate, resulting in no AC power reaching the unit. If you think the problem is the power plug, consult a service center for repair.

Record Player: Speaker Wire Loose

Whether the speaker is housed in the cabinet of the record player or connected externally, there is always the problem of a wire separating from the speaker terminal.

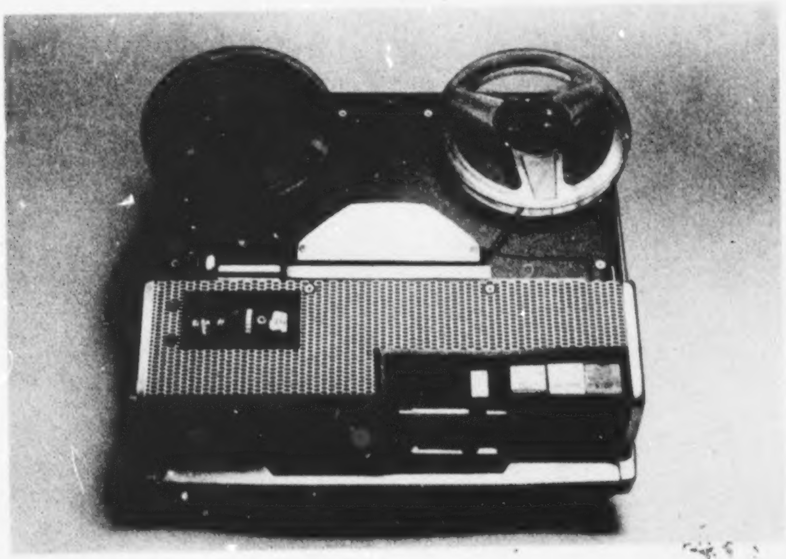
There will be two wires, which will normally be connected to a speaker terminal strip. If one of the wires becomes separated, use a low wattage soldering iron and solder the loose wire back on to the terminal, then turn on the record player and check for operation.

Record Player: Tube Model

If you have an older model record player that requires a warm-up period before sound is emitted from the speaker, the amplifier contains tubes instead of transistors. Some tubes will last almost as long as the record player. If your record player stops functioning and it is a tube model, it would be adviseable not to try to replace the tube yourself, due to high voltage, unless you are experienced in electronics. In most cases a local radio and TV repair shop can service the defective record player, since they are very commonplace items. Shops normally carry a good stock of tubes and replacement parts.

REEL-TO-REEL TAPE RECORDERS

Reel-to-reel tape recorders have been in schools for many years. Several maintenance problems may occur with this type of recorder.



REEL TO REEL TAPE RECORDERS

SYMPTOM	PROBLEM	SOLUTION
I. Non-functional	a. Power cord b. Fuse	a. Replace b. Replace
II. Not recording	a. Defective microphone b. Dirty recording heads c. Separated wires	a. Replace b. Clean c. Solder wire/or/send to service center
III. Distorted sound	a. Bad tape b. Defective speaker	a. Replace b. Replace/or/send to service center
IV. Cleaning	a. Lint and dust	a. Completely clean and demagnetize heads

If not proficient in performing the suggested operations, refer to a trained technician.

Reel-to-Reel Tape Recorder: Will Not Operate

Nearly all reel-to-reel recorders operate on AC. If a recorder stops functioning, one possible problem is that the AC power cord has become defective. Most AC power cords are attached to the recorder. If it is suspected that a power cord is defective, the recorder should be sent to a service center for replacement of the power cord.

Another possible solution to the difficulty could be replacement of the fuse. Nearly all reel-to-reel recorders contain a fuse. Some manufacturers design their recorders so that the fuse is wired inside with the amplifier and motor. Others place the fuse in a fuse holder and locate it in a position where it can easily be inspected.

Check Record Players (Fuse in Record Player), for a description of the various types of fuse holding devices and how to eject each fuse. The number on the metal ring will tell you the correct number of the fuse to replace. Remember, do not exceed the rating.

Simply replace the fuse with an exact number and try out the recorder. If the fuse blows out again, take the defective recorder to a service center for repairs.

Reel-to-Reel Tape Recorder: No Sound

At times when you turn on the recorder and no sound comes from the speakers, the cause may be that the external speaker jack is not making contact correctly. To correct this problem, insert a plug into the jack two or three times in fast succession. If sound now comes from the speakers you can assume that the jack is not making good contact and needs to be replaced. Consult a service center for replacement.

Reel-to-Reel Tape Recorder: Not Recording

If a recorder will play, but will not record, look for two possible problems. First, if the mike is defective, replace it with another microphone.

Second, if the recorder heads have become coated with oxide they need to be cleaned. Obtain a good grade head cleaner and clean according to operating instructions or service manual. Be sure to clean the eraser head as well.

Another possible reason a recorder is not recording is due to separation at the wires leading from the body of the recorder up to the recording heads. To inspect for this problem, remove the plastic cover from the recording heads by pulling it up. In some cases removing two screws from the plastic cover, then pulling up is necessary to remove the cover.

If separated wires are found, use a low wattage soldering iron and solder the wire back onto the head. Replace the cover and continue with normal operation.

Reel-to-Reel Tape Recorder: Distorted Sound

There are two possible problems. First, you may have a bad tape. If the sound is distorted from one tape, try another to see if the problem persists.

Second, the speaker may have become damaged. To check for this, connect an auxiliary speaker through the auxiliary speaker jack. If the sound is not distorted, assume that the internal speaker is damaged. Refer the defective recorder to a service center for repairs.

Reel-to-Reel Tape Recorder: Cleaning

Cleaning of the tape recorders is a must at least once a year. If the recorder is in heavy demand, cleaning more frequently is necessary. Clean the recording head and the erasure head. Consult a manual for the proper procedure.

Clean from around the heads any foreign matter, such as dust, lint, etc. Also clean any other moving parts such as capstan drive and roller. Replace the roller if it seems worn. While cleaning moving parts, be sure to clean the entire tape deck of dust and lint.

After the heads and deck have a thorough cleaning, use a head demagnetizer to remove the magnetism which may build up in the recording heads. Be sure to remove your watch during this process, as it may be affected by magnetic field created by the demagntizer. A demagnetizer may be obtained from a radio and TV supply.

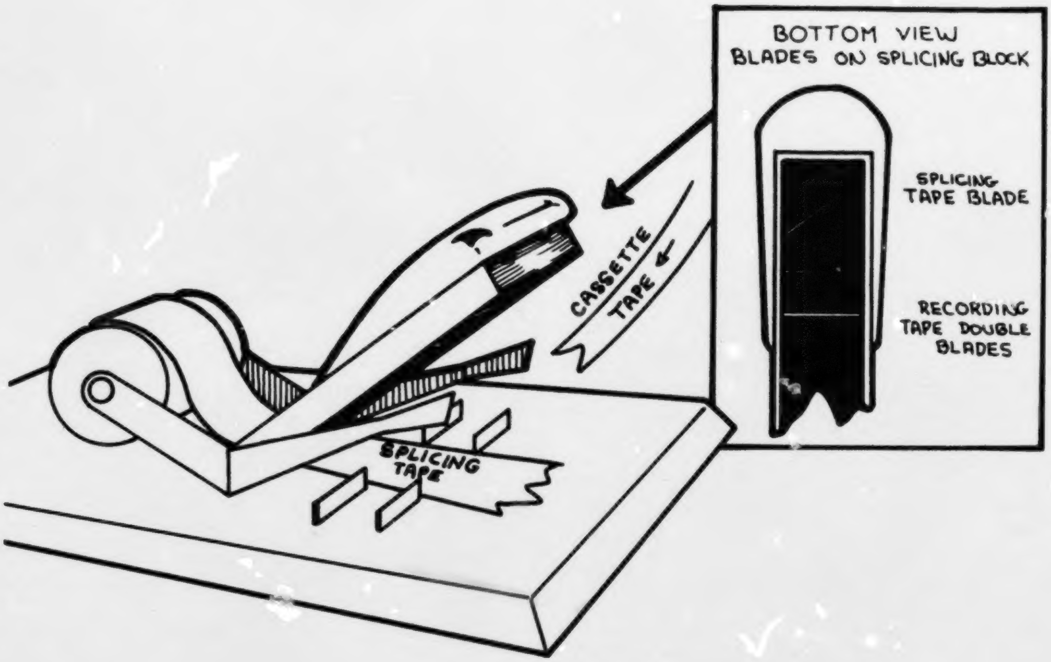
Once cleaning has been completed, place the cover back on the recorder and store. A clean recorder may save embarrassing failures.

Reel to Reel Tape Recorder: Tape Splicing

All recording tape consists of two very important components. One side is the "backing" or "base" side of the tape, which is always the side away from the tape recorder heads. This is the side upon which to place the splicing tape. The other side has a magnetic oxide covering. This is the side which comes in contact with the heads and is where the actual recording takes place. Never place splicing tape on this side as it could damage the recorder heads.

To repair or to edit a audio tape it is necessary to actually cut the tape and reattach it. Tools needed for splicing a tape are:

1. Splicing block
2. Splicing tape
3. Single edge razor blade


BOTTOM VIEW
BLADES ON SPLICING BLOCK
SPLICING TAPE BLADE
RECORDING TAPE DOUBLE BLADES
CASSETTE TAPE
SPLICING TAPE

Using the above materials follow these steps to repair a tape.

1. Locate the broken ends of the tape.
2. Place the tape inside the grooved slot on the splicing block, with the backing side up, slightly overlapping the loose ends so that the cut will be made on good, non-wrinkled tape.
3. With a single edge razor blade, cut the tape at a 45 degree angle, using the slot provided.

4. Remove the cut ends from the tape slot keeping tape straight and matching ends.
5. Carefully place approximately 3/4" of splicing tape over the slice.
6. Remove the tape from the splicing block. On a smooth, hard, clean surface burnish the splice with a fingernail.
7. Should splicing tape overlap the edge of the tape it should be removed with a razor blade.

Some specially designed tape splicers not only hold the tape to be repaired, they also hold the splicing tape and make all cuts.

CASSETTE RECORDERS

Cassette recorders are very common in today's public schools. They are used in many different ways to provide added educational benefits to classrooms. Cassette recorders, like any other audio-visual equipment may malfunction.

Cassette Recorder: Will Not Operate On Batteries

Most cassette recorders operate on batteries or AC electricity. If a recorder stops functioning on batteries, check for two possible problems.

First, present batteries may have lost their power and need to be replaced. A good rule to follow is never overlock the obvious. Replace the batteries only as described in the operations manual or in the battery compartment. Make certain they have been placed in the battery compartment correctly. There will be an indicator in the

CASSETTE RECORDERS

SYMPTOM	PROBLEM	SOLUTION
I. Will not operate on batteries	a. Power lost b. Poor contact between batteries and terminals c. corrosion on contacts	a. Replace batteries b. Reposition batteries c. Clean contacts
II. Will operate on batteries but not AC	a. Defective cord	a. Replace cord
III. Will not record	a. Microphone unplugged from recorder b. Damaged mircrophone	a. Plug in microphone b. Send to service center/or/replace
IV. Remote control ON-OFF	a. Switch off b. Switch malfunctions	a. Turn switch on b. Replace mike, cable, plug
V. Distorted sound	a. Bad tape b. Power lost in batteries c. Speaker d. ALC switch in OFF position	a. Replace tape b. Replace batteries c. Hook up auxiliary speaker/send to service center d. Move to ON position/or/consult service center
VI. Plays but will not record or play back	a. Tapes coated with oxide	a. Clean recording head and erase head/or/send to a service center
VII. Cleaning	a. Lint, dust, foreign matter b. Roller worn	a. Completely clean Demagnetize heads b. Replace roller/or/send to service center
VIII. Tape Broken	a. Tape broken	a. Splice tape

battery compartment to direct the correct position of each battery.

The second possible reason for malfunction is that the new batteries are not making good contact with the battery terminals. Reposition each battery and check for operation.

In addition, corrosion may have built up on the battery contacts. Visual inspection of these contacts will reveal the corrosion build-up. Take a sharp object, such as a knife, scrape off any corrosion, and clear out all scrapings from the battery compost. Reinsert the new batteries and try the recorder. If this does not solve the problem, refer the recorder to a service center.

Cassette Recorders: Will Operate On Batteries, But Not AC

Most recorders will operate on both batteries and AC from an external power cord. If the defective recorder will operate on batteries, but not AC, one possible problem is that there is a broken wire inside the cord.

Consult the operations manual or service manual for the correct part number and order. Not all power cords have the same type of connector, therefore, make sure you get the recommended type of power cord for your recorder.

Cassette Recorders: Operates And Plays, But Will Not Record

If your recorder plays cassette tapes but will not record, there are several possible problems.

First, make sure the microphone plug is plugged into the recorder correctly. Next, the microphone may have been damaged. The wire in the cable or the wires to the plug may have broken. It is advisable to send it to a service center for repairs.

Cassette Recorders: Remote Control, ON-OFF

Some recorders have a remote ON-OFF switch in conjunction with the microphone. Be sure the switch is on. If this switch stops functioning, it is advisable to replace the entire mike, cable, and plug. Cost of replacement is fairly inexpensive.

Cassette Recorders: Distorted Sound

Distorted sound in most cassette recorders can be attributed to the tape, the batteries or the speaker. In most cases it will simply be a bad tape. Play another tape and see if it clears up. Next, try a set of fresh batteries. This may solve your problem.

If tape or batteries are not the problem plug an auxiliary speaker into the auxiliary jack to check for quality sound. If this does not solve the problem send the recorder to a service center.

Another possible problem is that the recorder may have an ALC (Automatic Level Control). With this control in the ON position, the ALC automatically controls the amount of sound being picked up when the recorder is in the record mode.

With the ALC in the OFF position, the recorder will not automatically adjust the amount of sound being recorded, thus loud voices may produce distortion. If distortion is still present after moving the ALC to ON, the speaker may be defective. Consult a service center for repair.

Cassette Recorder: Plays But Will Not Record Or Play Back

With use or with some bad tapes the recording head will become coated over with oxide from the tape. To solve this problem, secure a good grade of tape head cleaner and clean the recording head and the erase head. Then try a tape, utilizing all the normal functions of the recorder. If the problem still persists, take the recorder to a service center for repair.

Cassette Recorder: Cleaning

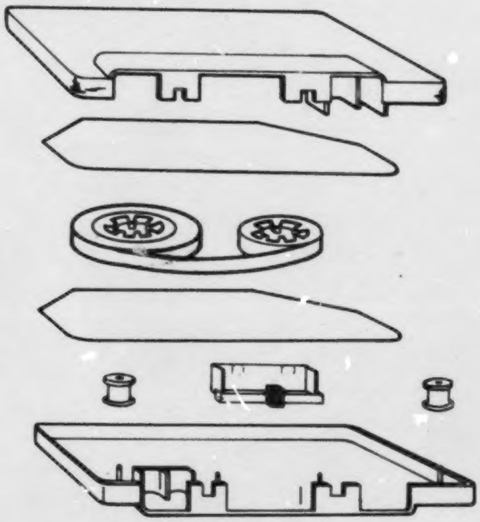
At least once a year or with heavy use of the recorder, cleaning is a must. Clean the record head and erase with a head cleaner. Consult the operations manual or service manual for the proper method.

Clean around the heads, moving parts, and entire tape compartment and remove any foreign matter, such as dust, lint, etc. with forced air or a dust cloth. Also clean any other moving parts such as the capstan drive and the roller. If the roller seems to be worn, replace it. Consult a service center for repair.

After the heads and deck have a thorough cleaning, use a head demagnetizer. This device is used to remove the magnetism which may build up in the recording heads. Remove your wristwatch in the process, due to the magnetic field created by the demagnetizer. A demagnetizer may be obtained from a radio and TV supply. Once cleaning is complete, place the cover back on the recorder and store or return it to active use.

Cassette Recorder: Repair Of Cassette Tapes

As previously mentioned cassette tapes can be spliced back together. Cassette cases are put together with screws or the two plastic sides are bonded together with glue.



The first step is to separate the two halves of the cassette tape. If screws are used, remove them with a screwdriver, normally a small Phillips. If glue was used to assemble the cassette case, run a razor sharp knife along the edges of the two halves, forcing them apart.

It may be impossible to keep from destroying the cassette case to remove the tape. Because of this, it is wise to always replace the tape in a cassette which may be screwed together. These cassettes are readily available.

Remove the top half of the cassette and carefully remove the slip sheet. A slip sheet is a well lubricated pad upon which the tape and reels rest and move smoothly.

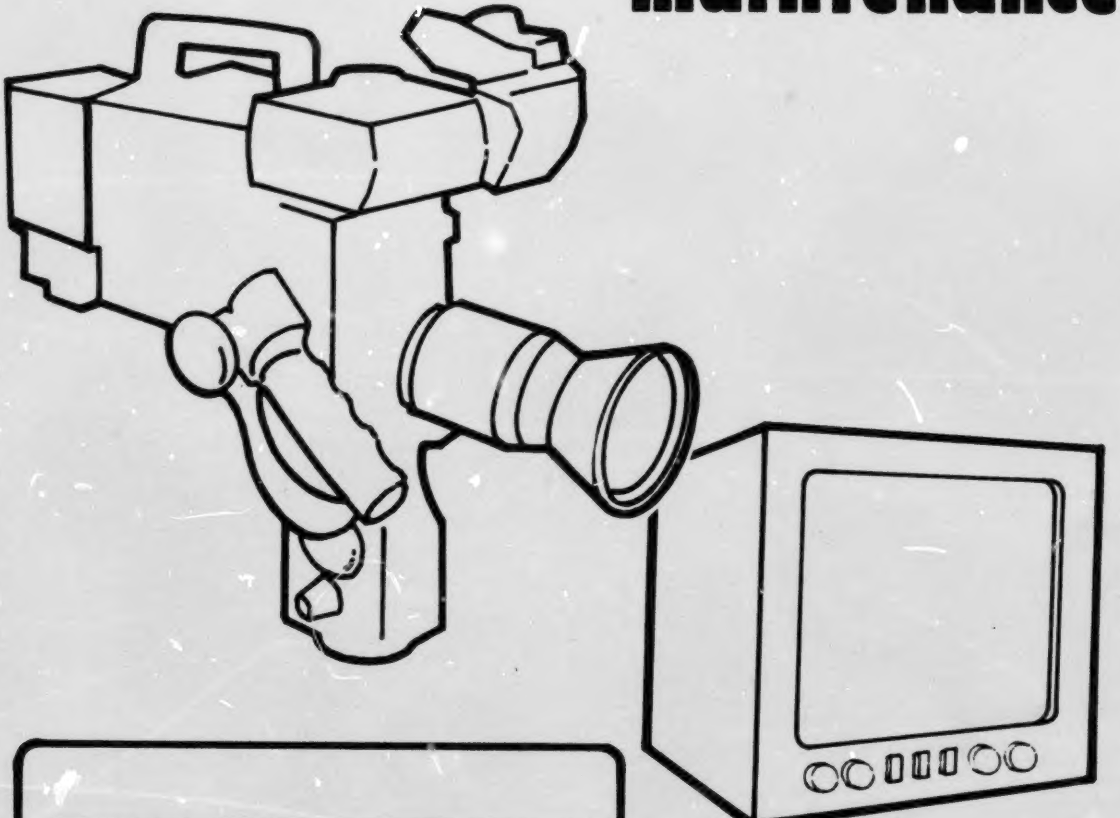
Next remove the tape and reels, and when these have been removed, inspect the broken tape. Splice as discussed earlier, making sure that, after the tape has been spliced, any excess is cut off making both slides smooth.

Now the fun begins. Reassemble the tape just as it came apart, making sure all the parts of the cassette tape are in the case in the proper order. Once assembled, it should fit exactly as it did before, and both spools should rotate smoothly. Insert the four screws and tighten slightly. If the cassette was glued together, apply a small amount of glue on four corners and reassemble. You may prefer to obtain a screw-together cassette case to use at this point, as it is easier to refasten and use screws than to glue.

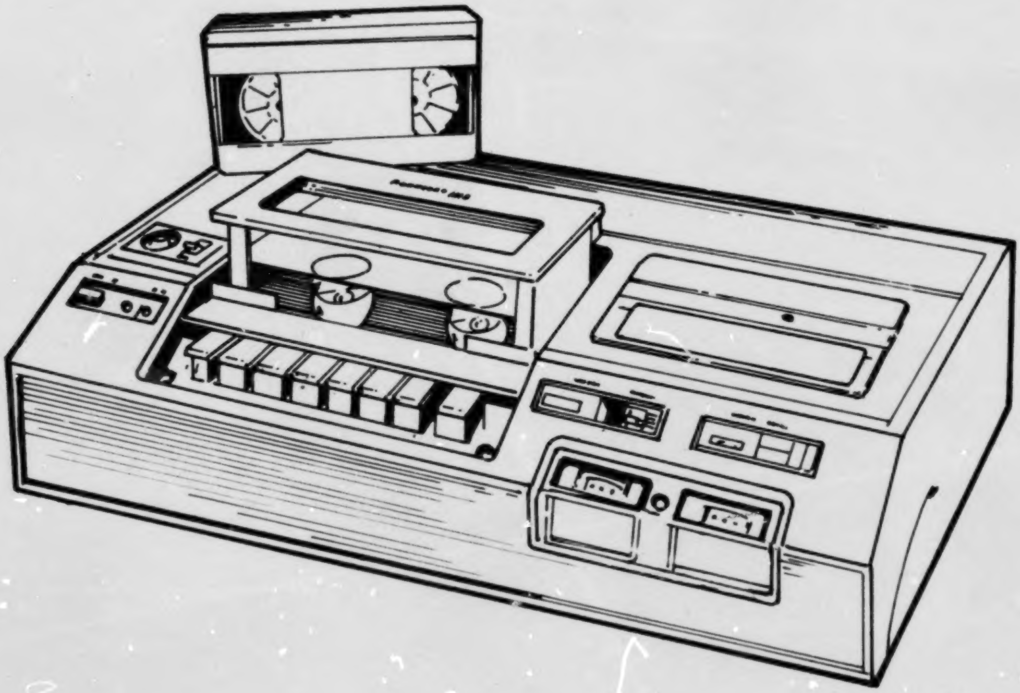
Check for smooth rotation of both reels. Apply pressure to the cassette with a heavy book or some other object while the glue dries. Once the tape is assembled and working properly, make a copy and keep the original as a backup.

See "Tape Splicing" under "Reel-to-Reel Tape Recorder".

VIDEO RECORDERS- simple care and maintenance



Video Recorders — Simple Care and Maintenance



Video tape equipment has come further in a shorter time than any other audiovisual aid. New developments have been accepted and used quickly by the general public.

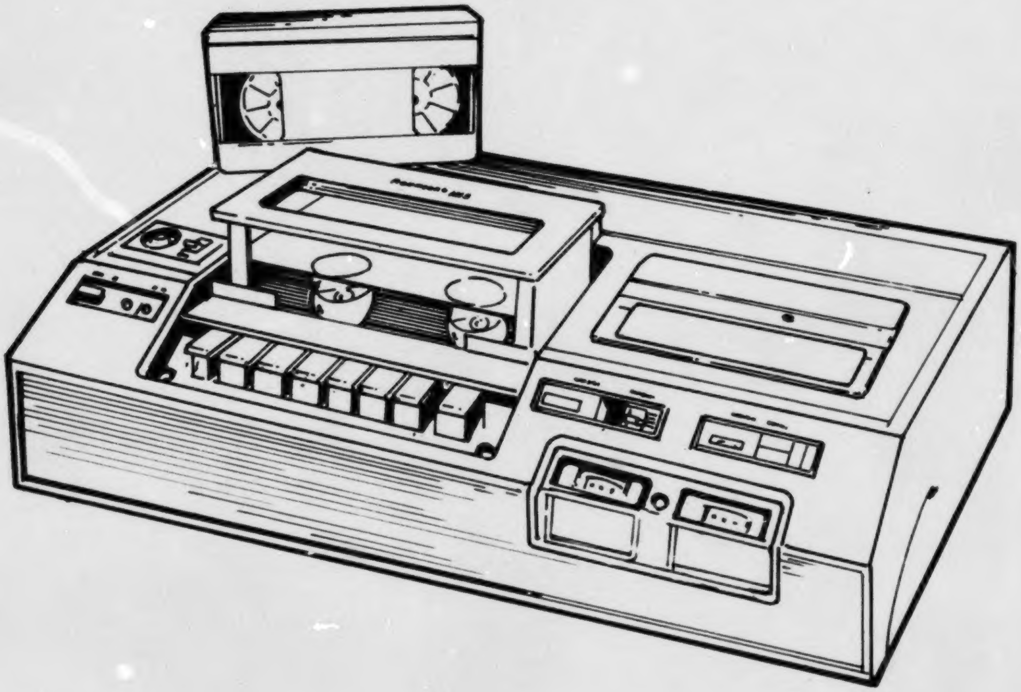
Sony introduced, in 1967, the first portable 1/2 inch video tape recorder (VTR). Being an open, or reel-to-reel type recorder, the video heads, audio heads, all tape guides and the tape were exposed to the elements. Also, the tape was manually threaded, which meant constant cleaning of anything the tape touched as it went through the machine.

In 1972, with the introduction of the 3/4 inch Umatic Video

VIDEO RECORDERS

SYMPTOMS	PROBLEM	SOLUTION
I. Picture on TV monitor snowy	a. Faulty tape b. Dirty video heads	a. Play different tape b. Clean video heads
II. No sound from monitor	a. Volume control low b. Faulty tape c. Dirty audio heads	a. Turn up volume b. Play different tape c. Clean audio heads
III. No picture, sound	a. Cable wire broken b. Dead battery(s) c. Fuse blown	a. Solder broken wire/ or/send to service center b. Install new battery(s) c. Check building fuse box and replace fuse
IV. Other video malfunctions	a. Unplugged b. Video lines improperly connected c. Extensive service needed	a. Plug into electrical receptacle b. Connect properly to video socket on back of monitor and/or camera c. Send to service center

Video Recorders —
Simple Care and Maintenance



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Cassette Recorder (VCR), routine maintenance was cut drastically. All tape heads and guides were inside the machine. Even the tape itself was a new and better design, and housed in a protective plastic cassette. Only the machine, and not human fingers, touched the tape, helping keep the tape clean and free of moisture.

The introduction of the 1/2 inch VCR made general usage more affordable. Video taping in now taking place in industry, education and the home as well.

Video-Preventive Maintenance

Because of the sensitivity of both video hardware and software, care should be given to a few preventive maintenance techniques. Video tape should be stored in a cool, dry room (not more than 40% relative humidity). In most cases, it is wise to place it in the same room as the VCR. Video tape must not be stored in sunlight. An easy way to remember these tips is that tape can be stored in a room that you yourself would not mind working in for many hours.

In addition, it is important to keep tape in its protective plastic case. The cassette should be placed in a vertical position, when stored on a shelf.

If a tape has been sitting on the shelf for quite a few months, it is wise to fast forward, then rewind the tape through the machine. This helps to repack the tape on the reel, and to dry it out if any moisture has collected on the tape.

Video: Cleaning

When handling reel-to-reel tape, be careful not to touch more than the first foot or so of the "leader" (the beginning of the tape that has no material recorded on it.) Oil from your fingerprints picks up dirt and is transferred to the guides and head on the VTR. This is one problem you need not worry about when using cassette tape, since it is fully enclosed.

Make a periodic inspection of all equipment to remove dust including chalk dust. Dust gets into cable connectors, and tube or transistor sockets (if components are not wired in). It also invades controls, such as on-off switches, volume controls, slide switches, and recorder heads.

To eliminate both types of dust from your video equipment, keep all hardware under dust covers while it is not in use. Periodically use forced air on the equipment surface to remove dust or chalk dust. If forced air is not available, use a clean dust cloth.

Because of the new enclosed design of cassette machines and tapes, cleaning is not as serious a problem as it was with reel-to-reel equipment. However, with use, oxide from the video tape will coat either or both of the two video heads. When this happens, the picture on the television monitor will appear snowy.

To make certain that a dirty video head is the problem, play a tape that you know is good. If the picture on the monitor appears snowy, you can assume the video head should be cleaned.

Although readily available, cotton swabs are not the best tool to use for cleaning video tape heads. Small particles of cotton can be left attached to the heads, and if not removed, can damage the machine. Use instead high grade chamois, found at the local automotive parts store and cut into smaller squares (approximately 5" x 5"). Some video tape recorders may come equipped with a cleaning tool which consists of a plastic stick with treated cloth attached to one end. (Caution: With repeated application of cleaning solution, the adhesive holding the cloth to the stick disintegrates and transfers to the VTR components.)

Care should also be taken in selecting cleaning fluid. Rubbing alcohol is widely used; however, it contains a high amount of water, which takes longer to dry. FreonTF® is also used, but is expensive.*

Denatured alcohol is available at drug stores, and is reasonably priced. And last but not least, contact your local video dealer for recommendations for cleaning fluid for *your* equipment.

Video: Cleaning Video Heads With Chamois

First, locate one of the video heads by rotating the head drum assembly. (The video heads consist of two heads directly across the head drum assembly from each other.)

---

*A spray solvent.

Second, saturate a portion of the chamois in head cleaner *gently*. Hold the chamois stationary. Third, with one finger, slowly *rotate the heads*, two or three times by the chamois.

Video: Cleaning Video Heads With Tool

First, rotate the video heads to a position which allows easy access. Second, moisten the tip of the cleaning tool with the head cleaner. Third, with one finger, hold the edge of the head and press the tip lightly against it, moving the tip horizontally. NEVER MOVE THE CLEANING TIP VERTICALLY--YOU COULD DAMAGE THE VIDEO HEADS! After one is cleaned, rotate until the other head is exposed, and clean as described in step three.

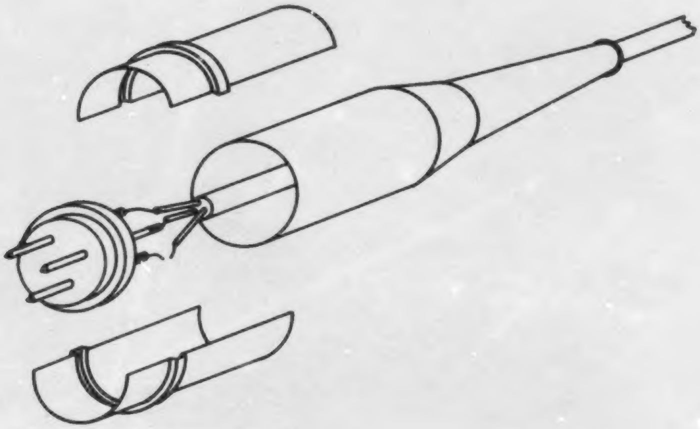
The same procedure applies to the audio head if no sound is heard from the television monitor. The problem may again be that oxide from the video tape has coated this head. To check, place a good video tape on the video recorder. If no sound is produced from the monitor, the audio head may need to be cleaned.

To do this, use a cotton swab, saturated with either video head cleaner or audio head cleaner and stroke with a horizontal motion. With a dry chamois carefully wipe along the path the tape travels through the VTR. If deposits cannot be removed, dampen the cloth with cleaning fluid and repeat the cleaning process.

Video: Television Cables

All television equipment must be connected together with either video or power cables. With frequent use these cables may short or break internally, normally at the cable connector (the point where the cable is attached to a connecting device that fits on to a television monitor, recorder, or camera). Eight to ten percent of all video malfunctions are due to cable malfunction. If in doubt about a cable, use a volt-ohm-meter, to check continuity.

Repairing a short or break requires a simple separation of the shield or cover around the connecting device. Under the shield or cover, cable wires are soldered to a cable socket. If a wire is broken, simply remove approximately 1/8 inch of the covering (normally plastic) from around the broken wire, and solder the wire back to the cable socket. Reassemble the shield or cover around the cable socket and it will be ready for use.



On portable units check all cable plugs, and battery voltage, again using the VOM. If nothing functions after all connections have been made, check the building fuse box for a blown fuse.

Video recorders and cameras are considered to be technical in nature. If you are not familiar with the equipment and its operation, it would be advisable to consult with a technician or a service center. Remember video recorders and TV cameras both contain HIGH VOLTAGE.

If a television set or monitor malfunctions, first check to make sure it is properly connected to an electrical receptacle, then check to make sure video lines are properly connected to the video socket on the back of the monitor and/or camera.

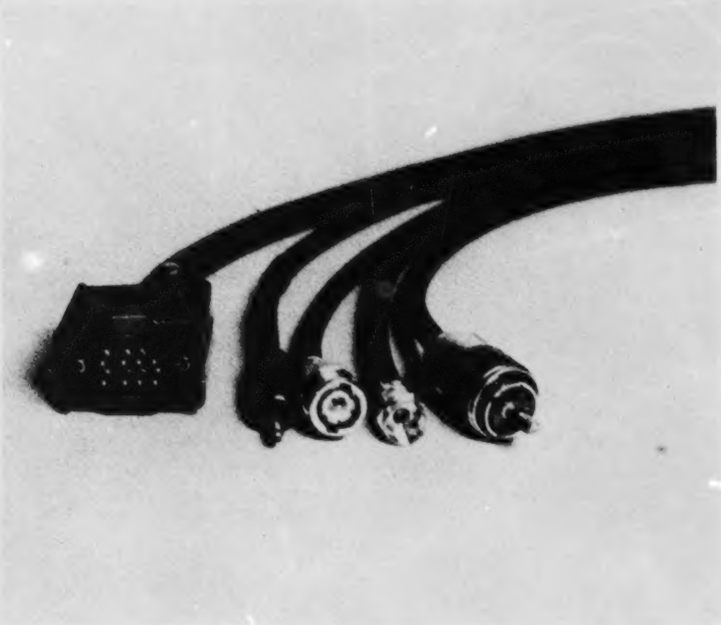
If more extensive service is required, consult a technician or send the monitor to a TV service repair center. Once a year, video recorders, television cameras, and monitors should be cleaned and serviced by a technician.

Video: Proper Handling of Video Equipment

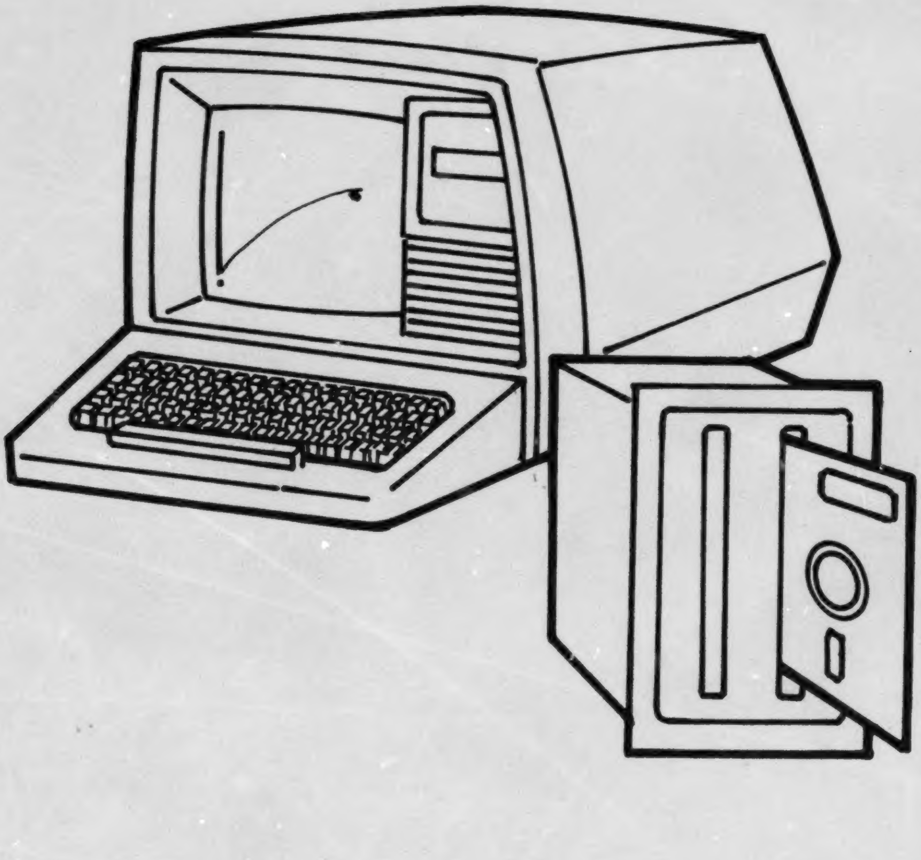
To prevent failures with video equipment follow the suggestions listed below.

1. Keep all video recorders covered, with dust covers. Even a simple sheet of plastic covering the exposed video equipment will help.
2. Routinely clean the video and audio heads, guides, rollers, and tape path.
3. Keep all video tapes in plastic storage containers.

4. If the VTR is subjected to severe temperature change, DO NOT operate until the machine AND tape have climatized to the new atmosphere. Moisture may accumulate inside, and clogged heads may result.
5. When recording, if time and equipment permit, make a test tape to make sure the camera, VTR, and/or monitor are working properly.
6. Keep spare cables on hand to replace broken cables.



User's Guide To Care And Maintenance Of Microcomputers



User's Guide to Care And Maintenance of Microcomputers

If it's microcomputer equipment--breakable, mechanical, electronic--made of metal or plastic and screws--if it's a machine rather than a book--library media specialists should use the same care and maintenance required of all high technology equipment. Special precautions should be taken in terms of preventive management, and specific problems with the technological mechanisms should be left to the discretion of a computer service specialist. Education of school personnel responsible for care and use of this equipment should be consumer/user specific in nature. For example, the logic of integrated circuitry can remain the province of the computer specialist. But everyone involved would know that the design of that circuitry will limit the peripherals that can interface with it.

MICROCOMPUTER

SYMPTOMS	PROBLEM	SOLUTION
I. No power	a. Equipment unplugged	a. Plug into electrical receptical
II. Equipment malfunctioning	a. Equipment malfunctioning	a. Call service representative

Microcomputer: Hardware

Preventive maintenance is as important in the care and storage of microcomputer hardware as it is with audiovisual equipment. As with all electronic equipment, care in cleanliness is essential. Precautions should be taken against any liquids or solid particles being dropped into the keyboard or any other component of the computer system where small openings would allow such items to interfere with the works of the machinery.

When not in use, or when in storage, hardware should have adequate anti-dust coverage. Most manufacturers have dust covers available for machinery, although some computer owners use vinyl table cloths and other "make shift" coverage. If economically feasible, storage devices made specifically for the equipment usually provide the best protection. It is also important that equipment not be stored for a long period of time in extreme heat or cold. Moderate temperature is essential for best use, care and storage of computer equipment.

Use of the hardware should be preceded by careful study of all owner/operator manuals and materials available from the specific vendor. This will insure adequate amperage, and other considerations that lead to satisfactory operation.

If the machinery appears to malfunction, don't reach for the hammer! The best approach to repairs should be contacting your service representative. The microcomputer is a highly technological machine and should be repaired only by qualified personnel. Service contracts and availability of personnel to service machinery should be an important consideration in the evaluation processes prior to purchase.

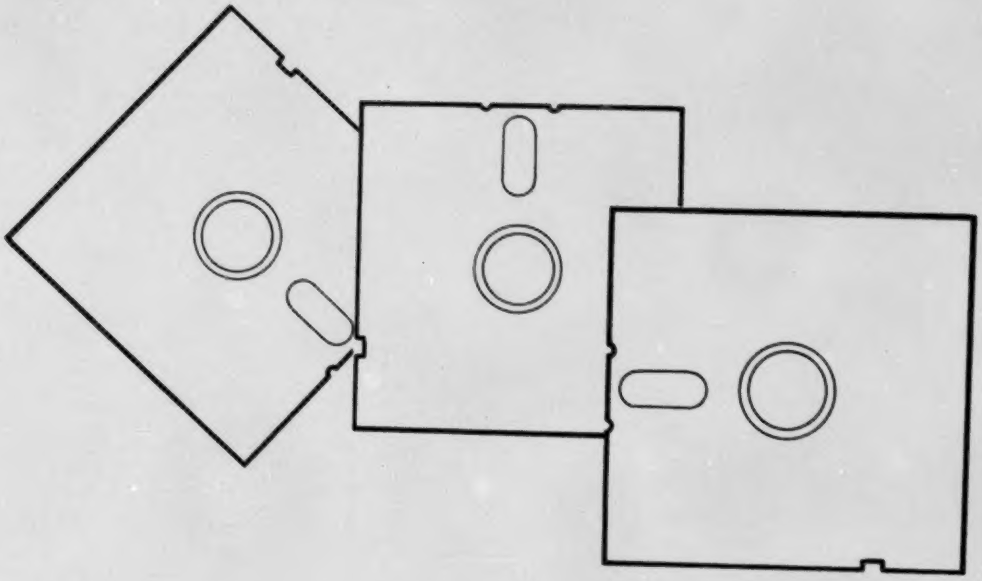
The technological advantages of the microcomputer will be of little value if your machine doesn't function properly and service isn't readily available.

Microcomputer: Software

Software is made available for microcomputers through three main devices--audio cassette, software disks, and the ROM cartridge. Each requires slightly different methods of care and storage.

Microcomputer Software: Audio Cassette

Audio cassette storage is popular largely due to its low cost. However, because of its special format, loading software from a cassette can take up to five minutes, and which has to be an important consideration when it is being used in instructional programs with students. Care and maintenance of audio cassette tapes was discussed along with cassette recorders earlier in this manual.



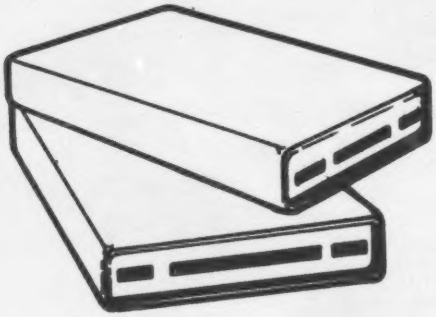
Microcomputer Software: Disks

Most disks available for microcomputer are referred to as floppy disks, in contrast to the hard disks used in mainframe computer systems. The flexible disks are 8 inches in diameter, or more commonly in micros, 5 1/4 inches (or mini-floppies). The disks should be handled with extreme care, as many things will affect the storage capabilities.

It is important that floppy disks be kept out of direct sunlight and that they be stored in a location out of extreme temperature range. Great care should be taken to protect the disks from dust accumulation. Storage units for floppy disks are available from most commercial software and hardware vendors. Again, if at all feasible in terms of money available, these devices offer the best protection.

A disk is protected in a cardboard sleeve which has cut-out areas that allow the disk drive to contact the disk itself. The exposed parts of the floppy disk are sensitive to magnetic force fields. All disks should be kept from contact with magnetic forces.

The disk should be handled in the same manner one would handle a glossy print photograph. Nothing should come in contact with the exposed part of the disk except the disk drive of the machine.



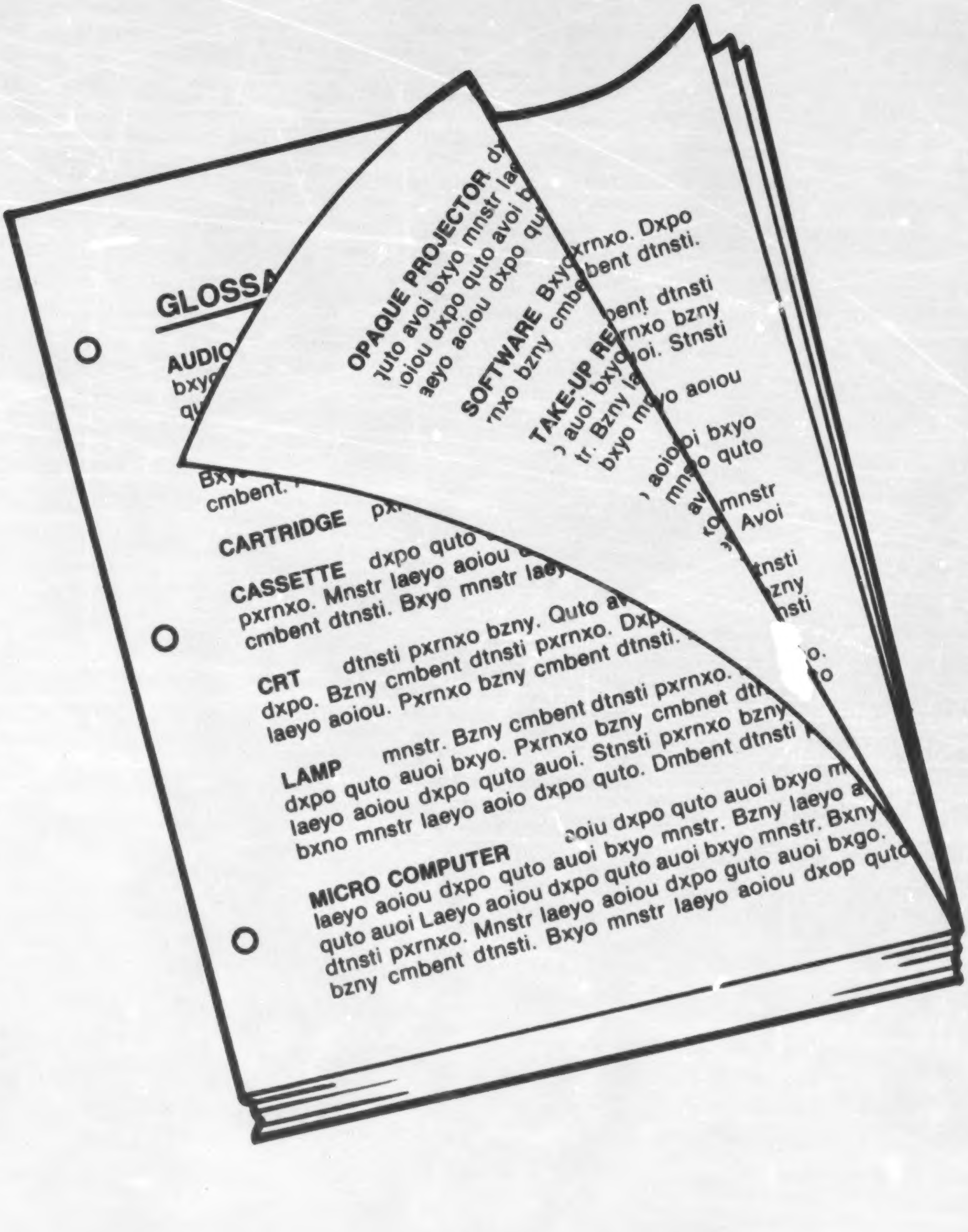
Microcomputer Software: Cartridges

A third kind of memory device which some microcomputers are designed to accept is a preprogrammned ROM chip sealed in a small cartridge. These cartridge cases are customized to fit only one brand of computer and cannot be switched among the different cartridge accepting micros. They are termed by some manufacturers "ROM packs" or "command modules." These cartridges are usually very sturdy and require minimal care in use and storage. Unlike tapes and disks, data stored on an ROM chip cannot be copied and has the advantage of being copyright secure.

Microcomputers: Software Copyright

Software for microcomputers is protected by copyright laws, just as are textbooks and most other published materials. Copying software, with exception of the ROM cartridge, is not much harder than making photocopies of textbooks, and is subject to the same abuse. Software vendors frequently ask schools to sign contracts agreeing either to not copy the software or to pay for a license to copy. Infringement of the copyright law would be a serious deterent to the development of educational software/courseware.

Glossary


GLOSSA
AUDIO
CARTRIDGE
CASSETTE dxpo quto
pxrnxo. Mnstr laeyo aoiou
cmbent dtnsti. Bxyo mnstr
CRT dtnsti pxrnxo bzny. Quto
dxpo. Bzny cmbent dtnsti pxrnxo.
laeyo aoiou. Pxrnxo bzny cmbent dtnsti.
LAMP mnstr. Bzny cmbent dtnsti pxrnxo.
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MICRO COMPUTER aoiu dxpo quto auoi bxyo
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OPAQUE PROJECTOR
SOFTWARE
TAKE-UP RE
pxrnxo. Dxpo
bent dtnsti.

GLOSSARY

AMPERES - Unit of electrical current

AUDIO JACK - One of two matching halves of a connector, which, when fastened together make a complete circuit. The jack is the half into which the plug fits.

AUDIO PLUG - One of two matching halves of a connector, which, when fastened together make a complete circuit. The plug is the half that fits into the jack.

BATTERY COMPARTMENT - Special compartment in which batteries are positioned

BULK ERASER - Electronic device used to rearrange particles on magnetic tapes

CCTV - Abbreviation for closed circuit television

CAPACITOR - Electronic component that will store electrical energy or block the flow of direct current

CARTRIDGE - Pickup device attached to a tone arm of a record player that changes the stylus vibrations into electronic impulses

CARTRIDGE HOLDER - Holding device to hold a cartridge onto the tone arm of a record player

CONDENSOR LENS - Lens within a projector designed to condense the light coming from lamp onto the film

CONTACT CLEANER - Special cleaning solution designed to clean electronic parts

COOLING FAN OR BLOWER - Exhaust fan found in audio-visual equipment to reduce the heat created by the projector lamp

ELECTRICAL OUTLET - Outlet in the wall, floor, for electricity

ERASE HEAD - Recording head with only one purpose, to rearrange the magnetic particles within a magnet tape into an inaudible pattern

EXCITER LAMP - Small size lamp that projects light onto the sound portion of 16mm film

FRESNEL LENS - Special lens found in an overhead projector. The fresnel lens take the place of the condenser lens

FUSE - Short piece of wire wiithin a glass tube which will melt or break when the current exceeds the rated value

HARDWARE - Audio-visual equipment

IDLER WHEEL - Wheel designed with rubber on the outside, whereby power from the record player motor is transferred to the idler wheel, then to the inside of the turntable providing power for rotation

LAMP SOCKET - Special socket which lamps will fit

NEEDLE or STYLUS - See STYLUS

NUT DRIVER - Screwdriver type device with a slot for holding nuts that screw onto bolts

OBJECTIVE LENS - Lens designed to focus the picture from the projector onto the screen

ON-OFF SWITCH - Switch designed to allow electricity to flow through or stop the flow

PLIERS - FLAT NOSE - Pliers with long flat "fingers" with holding capability

PLIERS - LONG NOSE - Pliers with long holding "fingers"

PLIERS - WIRE CUTTERS - Pliers designed to cut wire

PLIERS - WIRE STRIPPERS - Pliers designed for stripping insulation off the wire

POWER CORD - An electrical cord connected to a piece of equipment, with the other end connected to an electrical outlet or other power source

PRINTED CURCUIT BOARD - Specially designed board upon which electronic parts are placed and connected together with small copper beads embedded into the board

PROJECTOR LAMP - High intensity lamp utilized to project pictures from projection equipment

RECORDING HEAD - Has two purposes (1) to record information onto a recording tape (2) to erase information from a recording tape

REMOTE CONTROL - System of controlling a device from a distance

RESISTOR - Electronic component that will restrict the flow of electrical current

SLIDE SWITCH - Switch that is positioned by sliding it up or down

SOLDERING IRON - Soldering iron with two heat settings, 100 WATT and 40 WATT

SOFTWARE - Materials used with audio-visual equipment

STYLUS or NEEDLE - Needle-like object on the cartridge, that rides on groves of a record and vibrates as the record rotates

TAPE DEMAGNETIZER - Device used to eradicate particles on recording tape

TAKE-UP REEL - Reel to roll up film being shown on a projector

TELEVISION MONITOR - Television set designed to monitor a television picture

TONE ARM - Swing arm on a record player that holds the cartridge where the stylus is positioned

TRANSISTOR CHECKER - Electrical device used to check transistors

TUBE CHECKER - Electrical device used to check tubes

TURNTABLE - Round platter on which the recorder rests while the tone arm follows the grooves of a record

VIDEO BOOSTER AMPLIFIER - Electrical device to increase video signals

VICE - Device which can be clamped to a work bench to hold items in place while they are being repaired

VOLT OHM METER (VOM) - Electrical measuring device to measure volts and ohms

VOLUME CONTROL - Control that adjusts the amount of sound coming from a speaker

VCR - Abbreviation for Video Cassette Recorder

VTR - Abbreviation for Video Tape Recorder

WATTAGE - Unit of electrical current

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Appendix

EQUIPMENT RECORD
MOVIE PROJECTORS

AV EQUIPMENT CHECKOUT, USAGE AND MAINTENANCE

AV Equipment Checkout, Usage and Maintenance Date For Period from ______ to ______

Accession No.__________ Model__________ Cost, List, New__________ Life Expectancy______________

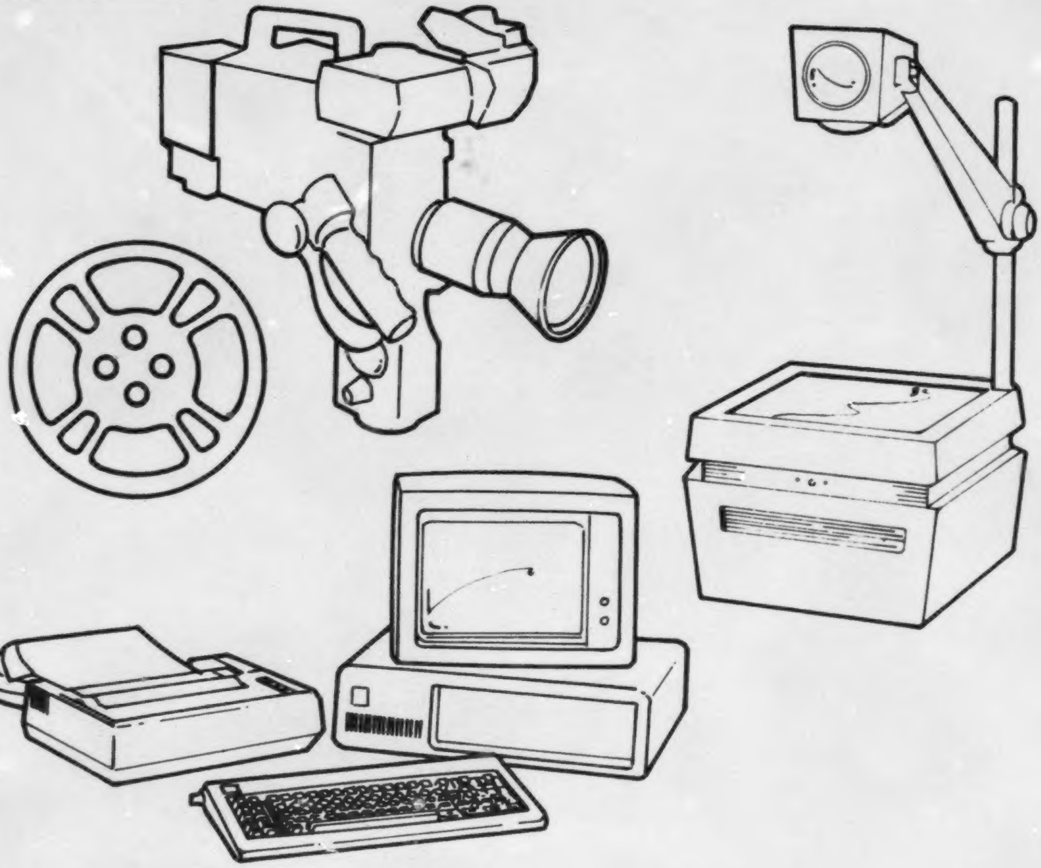
Mfr.________________ Serial No.__________ Dealer______________ Lamp Type______________

Maintenance Code: 1. Inspected, cleaned, oiled, dusted. 2. Needs replacement part. 3. Replacement part ordered. 4. Sent to _______. 5. Date sent out. 6. For minor repair/replacement. 7. For overhaul. 8. Return date from repair shop. 9. Cost of repair.

Date of Checkout	Checked Out To:	Return Date	Hours Use	Maintenance needed or performed	Date of Checkout	Checked Out To:	Date Return	Hours Use	Maintenance

Cleaning
Solution
DAK

TOPIC INDEX



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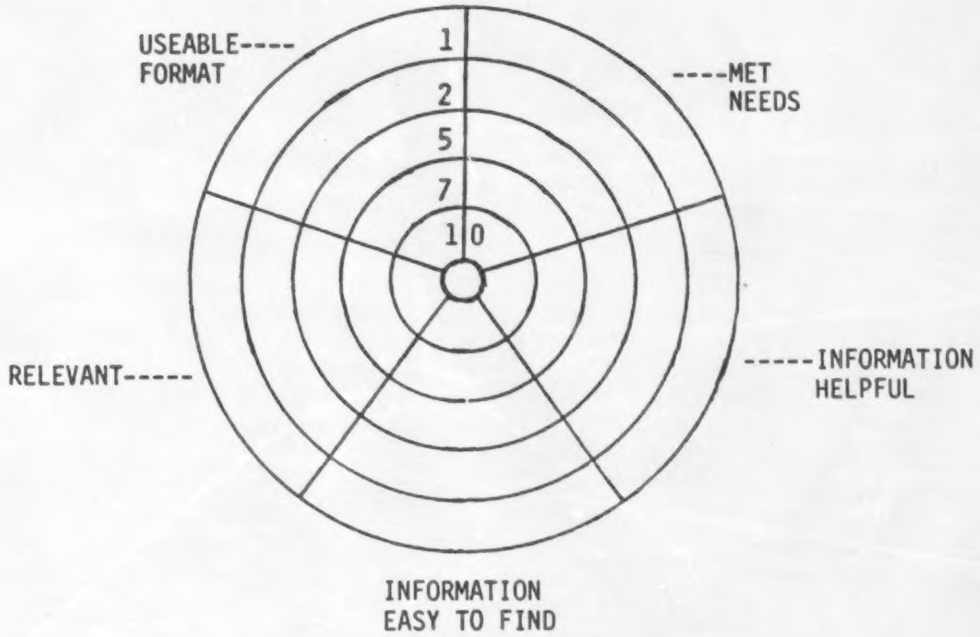
EVALUATION
KEYS: THE MEDIA MAZE

The State Department of Education would appreciate your help. Please darken the part of the bullseye in each area depicting the value of the information to you, with 10 being the highest score, 1 the lowest.


USEABLE FORMAT
MET NEEDS
1
2
5
7
10
RELEVANT
INFORMATION HELPFUL
INFORMATION EASY TO FIND

1. Circle grade levels you serve: K 1 2 3 4 5 6 7 8 9 10 11 12
2. What other areas do you feel should be covered.____________________
3. Comments/suggestions

Please return to: Barbara Duffy, Curriculum Coordinator
Curriculum Section
State Department of Education
2500 North Lincoln Boulevard, Suite 3-82
Oklahoma City, OK 73105